Department of the Interior:

U. S. NATIONAL MUSEUM.

— 6 —

BULLETIN

OF THE

UNITED STATES NATIONAL MUSEUM.

NO. 6.—CLASSIFICATION OF THE COLLECTION TO ILLUSTRATE THE ANIMAL RESOURCES OF THE UNITED STATES.

A LIST OF SUBSTANCES DERIVED FROM THE ANIMAL KINGDOM, WITH SYNOPSIS OF THE USEFUL AND INJURIOUS ANIMALS AND A CLASSIFICATION OF THE METHODS OF CAPTURE AND UTILIZATION.

BY

G. BROWN GOODE.

PUBLISHED UNDER THE DIRECTION OF THE SMITHSONIAN INSTITUTION.

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INTERNATIONAL EXHIBITION, 1876.

BOARD ON BEHALF OF UNITED STATES EXECUTIVE DEPARTMENTS.

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By G. BROWN GOODE, M. A.,

ASSISTANT CURATOR U. S. NATIONAL MUSEUM.

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ADVERTISEMENT.

This work is the sixth of a series of papers intended to illustrate t collections of Natural History and Ethnology belonging to the Unit States and constituting the National Museum, of which the Smithsoni Institution was placed in charge by the act of Congress of August 1846.

It has been prepared at the request of the Institution, and printed authority of the honorable Secretary of the Interior.

JOSEPH HENRY,
Secretary Smithsonian Institution

SMITHSONIAN INSTITUTION,
Washington, February, 1876.

PREFACE.

The following classification has been prepared by Mr. Goode to facilitate the work of collecting and arranging the material gathered by the National Museum to illustrate the resources of the United States as derived from the animal kingdom, in the International Exhibition of 1876. It is also intended to indicate the general character of the articles which are to be included in this branch of the exhibition.

Contributions of specimens of the different classes enumerated are much desired, for the purpose of making the proposed display complete, and should be addressed to the Smithsonian Institution, Washington, D. C.

JOSEPH HENRY,
Secretary Smithsonian Institution.

TABLE OF CONTENTS.

SECTION C.—METHODS OF PREPARATION.

INTRODUCTION.

The system proposed in the following lists has been hurriedly prepared, and is necessarily very incomplete; it is intended merely as a provisional classification, to be used in collecting the materials for the exhibition, and in their preliminary arrangement.

The first group, SECTION A, is an index to the whole series; it will include all North American animals which are directly beneficial or injurious to man. Although every species, down to the very least, exercises some influence upon human well-being, it seems scarcely practicable to attempt the exhibition of those which affect it only indirectly. Those species are considered useful which supply food, clothing, shelter, implements, materials, and amusement; those injurious which endanger the life or personal comfort of man, or destroy those animals and plants which are of direct benefit to him. In the enumeration of animals, the names of the orders are given, followed in parenthesis by the best-known names of the more important species included, and a brief note on their principal uses. This enumeration, being simply of convenience, makes no claim to zoological precision.

SECTION B embraces all instruments and methods employed by the hunters, trappers, and fishermen of North America, aboriginal and civilized. Not only those which are directly employed in destruction or capture are included, but the means made use of in pursuing or attracting the animals and fishes, and the personal equipment of the pursuer. The collection will be a monograph of *all* matters relating to the chase and the fisheries of the country. In preparing the classification here submitted, the principles of zoological classification have been followed as closely as possible; each distinct form has been considered a species; and the specific forms have been grouped into genera, families, and orders according to the general balance of their affinities. Form and manner of use have not been without weight, but superficial resemblance has been set aside, and the *idea* given the first importance. Thus, barbed spears and harpoons have been placed with the "hooked instruments," while plain spears and lances are grouped with the knives and clubs. In studying the place of the fire-arms and bows and arrows, the missile itself has been regarded as more important than the

machine which propels it, and the latter is placed in a subordinate relation.

In one group, that of nets, convenience in arrangement of the specimens seems to demand that *material*, a character of small importance, shall be made prominent. Two widely diverging groups of apparatus are associated under the head of nets, viz, encircling-nets, the true relations of which are with grasping and scooping instruments, and entangling nets which belong with the traps, where a third group of nets, the pound and weir nets are actually classed. Where the exigencies of administration of the specimens demand that they should be arranged otherwise than in their exact systematic position, full cross-references are given.

The simplest implements have always been placed first, the series advancing in the order of complication of structure. Thus we have in the beginning the apparatus of direct application, or tools, including, first, those implements which are used in the hand, and which increase its power in a simple way, such as clubs and slung-shot, which merely add to the weight of the fist, followed by the knives, axes, and spears, which in their simplest and primitive form were sharpened stones and pointed sticks. Second, are the grasping-implements, or those by which the power of the fingers is extended. In this series the same principle of progress from simple to complex is followed; in the scoop we have the idea of the hollow palm of the hand developed in various forms, while the grasping-hooks and grasping-lines are the artificial extensions of the

the use of which the strength of the arm is of no essential value, and the propelling power originates in chemical combustion.

Accessory to these are groups containing those articles used in the manufacture, testing, loading, and transportation of these missiles, and the machines which drive them through the air.

In a fourth division is the apparatus of angling, which is separated from hooked implements with which the form of the articles would naturally place them, since they are not implements of grasping, but partake of the nature of traps, being in part automatic.

The group of nets is a heterogeneous one, as has been stated above, consisting of two divisions, the first that of entangling-nets, belonging properly with traps, while encircling-nets are in idea instruments for grasping.

In arranging traps a logical succession has been preserved as far as possible. Those traps are considered the most simple in which the animal is penned by its own act, without any change in the arrangement of the trap. The pit-falls or "tipes" are first, followed by the mazes or labyrinths of greater or less complexity. Then come the traps in which the entrance is closed, either by the falling of a door or by the falling of a box-like trap, as a whole, so as to surround the animal. Under clutching-traps are placed those which seize the animal, as in the fingers, while crushing-traps are those which seize or impale it bodily. Adhesive preparations, such as bird-lime, close the series.

The accessory divisions, including hunting-animals, decoys, and disguises, and the methods and appliances of pursuit, do not admit any thorough classification, and are arranged with reference to convenience of exhibition.

SECTION C includes all methods of utilizing animals' products. It might be more satisfactorily arranged with the following section, were it not for the inconvenience of exhibiting models and tools in the same cases with the manufactured products; the arrangement of the two sections is nearly the same.

In SECTION D are grouped all useful substances derived from the animal kingdom. In order to avoid the omission of any products which are or may be obtained from North American animals, this enumeration has been made general, those not American being included in parentheses. This enumeration is far from complete, and is intended simply as an aid to future study in the same direction.

SECTION E includes all articles illustrating the culture and protection of useful animals.

SECTION A.

ENUMERATION

OF

ANIMALS BENEFICIAL OR INJURIOUS TO MAN,

(WITH A SYNOPSIS OF THEIR USEFUL APPLICATIONS.)

I. MAMMALS.

1. **FERAE:**

FISSIPEDIA. (Cats, pumas, jaguars, ocelots, lynxes, wolves and dogs, foxes, fishers, martens, minks, weasels, wolverenes, badgers, skunks, otters, sea-otters, bears, raccoons, and the domesticated cat, dog, and ferret.)

Useful products:

Food, (bears, raccoon, &c.) D. 1.
Fur, (all the group.) D. 6.
Leather, (dog, cat.) D. 20.
Textile fabrics, felt, (raccoon.) D. 8.
Ivory, teeth, (bear, fox, &c.) D. 9.
Claws used by Indians, (bears, puma.) D. 11.
Hair, for brushes, (badger, dog, weasel, skunk, bear.) D. 21.
Oil, (bears.) D. 27.
Perfumes, (civet, &c.) D. 28.
Medicinal products, (skunk.) D. 30.
Chemical agent, *album græcum*, (dog.) D. 30.

Useful traits:

Susceptible of domestication, (wolves (Indian dog,) foxes, otters, bears, raccoon, dog, cat, ferret.)
Employed in hunting, (dog, cat, ferret.) B. 40.
Employed in fishing, (otter.) B. 40.

1. FERAE—Continued.

FISSIPEDIA—Continued.

Injurious traits:

Enemies of man, (cats, wolves, bears.)

Enemies of domestic animals.

Marauders on crops, (bears, raccoon.)

Stench nuisances, (skunks.)

Modes of capture. B. I, II, III, VI, X.

PINNIPEDIA. (Fur-seals, sea-lions, hair-seals, hood-seals, sea-elephants, walruses.)

Useful products:

Food of aborigines. D. 1.

Fur, (fur-seals, &c.) D. 6.

Leather, &c., parchment from viscera, (sea-lions, hair-seals, walruses.) D. 20.

Oil, (hair-seal, hood-seal, sea-elephant, &c.) D. 27.

Ivory, (walrus.) D. 9.

Injurious traits: Destroy fish.

Modes of capture. B. I, III, V, X.

2. UNGULATA. (Bison, musk-ox, mountain-goat, mountain-sheep, antelope, moose, caribou, elk, deer, peccary, and the domesticated ox, goat, sheep, hog, horse, ass, and camel.)

Useful products:

2. UNGULATA—Continued.

Useful products:

Chemical products. D. 30.

Fertilizers. D. 31.

Useful traits: Susceptible of domestication.

Modes of capture. B. I, II, III, VI, IX.

3. PROBOSCIDEA. (Elephants.*)

Useful products: Ivory. D. 9.

4. SIRENIA. (Manatee, or sea-cow.)

Useful products:

Food. D. 1.

Leather. D. 7, 20.

Oil. D. 27.

5. CETE. (Whales.)

DENTICETE. (Beluga, narwhal, porpoise, black-fish, killer, grampus, sperm-whale.)

Useful products:

Food, Indian, (sperm-whale, porpoise.) D. 1.

Oils, (all the group.) D. 27.

Spermaceti, (sperm-whale,)

Leather, (porpoise, beluga.) D. 7, 20.

Bone and ivory, (narwhal, sperm-whale.) D. 9.

Perfume, *ambergris*, (sperm-whale.)

Injurious traits: Destroy fish and seals.

Modes of capture. B. I, II, III, X.

MYSTICETE. (Right, or whale-bone whales.)

Useful products:

Food, (right-whale.) D. 1.

Baleen. D. 12.

Oil, (right-whale, &c.) D. 27.

6. CHIROPTERA. (Bats.)

Useful products:

Food, Indians. D. 1.

Felting material. D. 8.

Guano. D. 31.

Useful traits: Destroy troublesome insects.

Injurious traits: Disseminate troublesome insects.

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* *Elephas primigenius*, found fossil in North America.

7. INSECTIVORA. (Moles and shrews.)

Useful products:

Fur, (moles.) D. 6.

Felting material, (moles.) D. 8.

Useful traits:

Destroy burrowing insects, &c.

Injurious traits: Burrowers.

Modes of capture. B. VI.

8. GLIRES. (Squirrels, prairie-dogs, showtl, marmots, musquash, beaver, rats, mice, lemmings, porcupines, rabbits, and the domesticated rabbit, and Guinea-pig.)

Useful products:

Food. D. 1.

Fur, (squirrels, showtl, marmots, musquash, beaver, lemmings, rabbit, &c.) D. 6.

Textile fabric, felt, (musquash, beaver, rabbit.) D. 8.

Ivory, (beaver.) D. 9.

Leather, (rat, beaver.) D. 7, 20.

Hair and down, (rabbits.) D. 21.

Quills, (porcupine.) D. 21.

Perfume, *castoreum*, (beaver.) D. 28.

Useful traits: Susceptible of domestication, (squirrels, rabbits, &c.)

Injurious traits: Marauders.

[redacted]

II. BIRDS.

11. PASSERES. (Thrushes, stone-chats and blue-birds, dippers, kinglets, titmice, nuthatches, creepers, wrens, larks, wagtails, warblers, tanagers, swallows, waxwings, greenlets, shrikes, finches, starlings, black-birds and orioles, crows and jays, fly-catchers, and domesticated sparrow, canary, &c.)

Useful products:

Foods, (thrushes, rice-birds, &c.) D. 1.

Ornamental feathers. D. 23.

Useful traits:

Destroy insects.

Song-birds, (generally susceptible of domestication.)

12–13. PICARIÆ AND CUCULI. (Night-hawks, whippoorwills, swifts, humming-birds, trogons, saw-bills, kingfishers, cuckoos, woodpeckers.)

Useful products: Ornamental feathers, (humming-birds, trogons.) D. 23.

Useful traits:

Destroy noxious insects, (night-hawks, swifts.)

Destroy tree-borers, (woodpeckers.)

Injurious traits:

Destroy fish, (kingfishers.)

Destroy birds'-eggs, (cuckoos.)

Destroy fruit, (woodpeckers.)

Destroy trees, (sap-sucker.)

14. PSITTACI. (Parroquet and domesticated parrots.)

Useful products: Ornamental feathers. D. 23.

Useful traits: Susceptible of domestication.

15. RAPTORES. (Owls, hawks, eagles, vultures, buzzards.)

Useful products:

Ornamental feathers. D. 23.

Quills. D. 22.

Useful traits:

Susceptible of domestication and use in hunting.[1]

[1] Nine species of falcons, hawks, and owls have been employed in the chase by Europeans.

15. RAPTORES—Continued.

Useful traits:

Scavengers, (vultures, buzzards.)

Destroy vermin, (owls, hawks.)

Injurious traits: Destroy domestic animals, eggs, &c.

16. COLUMBÆ. (Pigeons and doves.)

Useful products:

Food.

Ornamental feathers. D. 23.

Useful traits:

Game-birds.

Susceptible of domestication.

Used as targets, (wild pigeon.) B. 25.

Used as carriers, (carrier-pigeon.)

17. GALLINÆ. (Turkey, grouse, partridge, sage-cock, ptarmigan quail, and the domesticated peacock, guinea-fowl, and fowl.)

Useful products:

Foods, flesh. D. 1.

Ornamental feathers. D. 23.

Quills. D. 22.

Albumen. D. 30.

Useful traits:

20. ALECTORIDES. (Cranes, rails, crakes, gallinules, coots.)

Useful products:

Food, (rails, crakes.) D. 1.

Feathers. D. 23.

Useful traits: Susceptible of domestication, (cranes.)

21. LAMELLIROSTRES. (Flamingoes, swans, geese, ducks.)

Useful products:

Food: Flesh, (geese, ducks.) D. 1.

Eggs, (geese, ducks.)

Ornamental feathers, (flamingo, geese, &c.) D. 23.

Down, (geese, ducks.) D. 23.

Useful traits:

Susceptible of domestication, (geese, ducks.)

Used as decoys for other swimmers, (brants, ducks.)

22. STEGANOPODES. (Gannets, pelicans, cormorants, darters or water-turkeys, frigate birds, tropic birds.)

Useful products:

Ornamental feathers, (darters, tropic birds.) D. 23.

Leather, (of feet.) D. 20.

Useful traits: Susceptible of domestication.[1]

23. LONGIPENNES. (Gulls, terns, skimmers, petrels, albatrosses shearwaters.)

Useful products:

Food, eggs. D. 1.

Ornamental feathers, (gulls, terns, &c.) D. 23.

Oil, (petrels, &c., used by Eskimos.) D. 27.

24. PYGOPODES. (Loons, grebes, auks, puffins, guillemot, murres.)

Useful products:

Foods, (eggs.) D. 1.

Ornamental feathers, (grebes.) D. 23.

Feathers used as furs, (grebes, auks, &c.) D. 8.

25. SPHENISCI. (Penguins.)

Useful products:

Feathers used as fur. D. 6.

Oil. D. 27.

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[1] *Graculus carbo* used in Europe for fishing and a similar species in China.

III. REPTILES.

26. CROCODILIA. (Alligator, crocodile.)

Useful products:

Food. D. 1.

Ivory. D. 8.

Leather. D. 20.

Oil. D. 27.

Musk. D. 28.

Injurious traits:

Enemies of man and domestic animals.

27. TESTUDINATA. (Tortoises, terrapin, leather-back, green, loggerhead, and hawks-bill turtles.)

Useful products:

Food: Flesh, (green turtle, terrapin, gopher tortoise.) D. 1.

Eggs, (green turtle, terrapin, gopher tortoise.)

Oil from eggs, (green turtle.) D. 27.

Shell, (turtles.) D. 13.

Perfume. D. 28.

Methods of capture and transportation. E. 3.

28. LACERTILIA. (Lizards, skinks, horned-toads, chameleons, scorpions, joint-snakes, &c.)

Useful products: Food of Indians. D. 1.

Medicinal product: (Skink.) D. 30.

[redacted]

30. ANURA—Continued.

Useful products:

Weather indicators, (hyla.)

Useful traits: Destroy noxious insects, (toads.)

31. URODELA. (Salamanders, axolotls, and menopomes.)

Useful products: Foods, aboriginal, (axolotls.)

Useful traits: Aquarium use.

Injurious traits: Enemies of young fish.

32. PROTEIDA. (River-dogs, hell-benders.)

Injurious traits: Enemies of young fish.

33. TRACHYSTOMATA. (Sirens.)

V. FISHES.

34. PEDICULATI. (Sea-bats or devil-fish, goose-fish or angler, mouse-fish, &c.)

Useful products: Baits, (goose-fish.) D 1.

Injurious traits: Enemies of aquatic birds, (goose-fish.)

35. PLECTOGNATHI. (Sun-fish, rabbit-fish, porcupine-fish, swell-fish, box-fish, trunk-fish, cow-fish, file-fish, trigger-fish.)

Useful products:

Food, (file-fish, trunk-fish.) D. 11.

Clothing, (helmets made from porcupine-fish.) D. 20.

Oils, used in medicine, (sun-fish.) D. 27.

Shagreen, (file-fish, trigger-fish.) D. 30.

36. LOPHOBRANCHII. (Sea-horse, pipe-fish.)

Useful traits: Aquarium use.

37. HEMIBRANCHII. (Snipe-fish, trumpet-fish, stickleback.)

Useful traits: Aquarium use, (sticklebacks.)

Injurious traits: Destroy eggs of other fishes.

38. TELEOCEPHALI:

HETEROSOMATA, (soles, flounders, flatfish, turbot, halibut.)

Useful products:

Foods: Fresh. D. 1.

Smoked, (halibut.) D. 2.

Pickled, (halibut.) D. 3.

Baits, D. 5.

38. TELEOCEPHALI—Continued.

ANACANTHINI, (cod, pollock, haddock, hake, ling, cusk, burbot, rockling, lance.)

Useful products:

Food: Fresh. D. 1.

Salted, wet, (cod,) (cods' sounds, tongues.) D. 3.

Salted, dry, (cod, haddock, hake.) D. 2.

Bait, (lance.) D. 5.

Isinglass, (cod, haddock, hake.) D. 24.

Leather, (N. W. coast Indians, cod.) D. 27.

Oil, (cod, haddock, hake, livers.) D. 30.

ACANTHOPTERI, (Wolf-fish, blenny, oyster-fish, toad-fish, lump-fish, sea-snail, goby, sea-robin, gurnard, sculpin, sea-raven, Norway haddock or hemdurgan, red-fish, rock cod (west coast), black-fish, or tautog, cunner or chogset, parrot-fish, vurparous-fish (west coast), surgeon-fish, angel-fish, chætodons, sword-fish, bayonet-fish, scabbard-fish, mackerel, cero, tunny, bonito, crevallé, pompano, pilot-fish, dolphin, butter-fish, weak-fish, drum, croaker, king-fish, whiting, bass, sheepshead, scup or porgy, grunts or pig-fish, black bass, sunfish, strawberry bass, rock bass, perch, groupers, striped

38. TELECOPHALI—Continued.

PERCESOCES. (Atherines, mullet.)

Useful products:

Food: Fresh. D. 1.

Salted, smoked, (mullet, mullet-spawn.) D. 2.

Salted, wet, (mullet.) D. 3.

Bait, (atherines.) D. 5.

Scales, (mullet.) D. 14.

SYNENTOGNATHI. (Gar-fish, flying-fish.)

Useful products:

Food: Fresh. D. 1.

Salted, smoked, (gar-fish, flying-fish.) 1.

HAPLOMI. (Blind-fish, pike, pickerel, minnows.)

Useful products:

Food, (pike, pickerel.) D. 1.

Bait, (minnows.) D. 5.

Injurious traits:

Enemies of other fishes and of aquatic birds, (pikes, pickerels.)

ISOSPONDYLI. (Capelin, oulachan, smelt, white-fish, salmon, trout, tarpum, herring, menhaden, shad, alewife or gaspereau, anchovy, &c.)

Useful products:

Food: Fresh. D. 1

Salted, (shad, salmon, white-fish, herring, &c.) D. 2.

Smoked, (herring, salmon, &c.) D. 1.

Canned, (salmon, menhaden, sardines, &c.) D. 1.

Eggs. D. 1.

Sauce, (anchovy.) D. 3.

Oil, (salmon, oulachan, white-fish, menhaden, herring.) D. 27.

Bait, (capelin.) D. 5.

Ornamental scales, (tarpum.) D. 14.

Guano, (menhaden, herring, &c.) D. 31.

Modes of culture. E. 9.

EVENTOGNATHI. (Suckers, dace, buffalo-fish, carp, tench, &c.)

Useful products:

Food. D. 1.

Bait. D. 5.

Artificial pearls. D. 29.

Modes of culture, (including domesticated species.) E. 9.

39. NEMATOGNATHI. (Cat-fish, "bull-heads," &c.)
    Useful products:
        Food. D. 1.
        Guano, (cat-fish.) D. 31.
40. APODES. (Eels, congers.)
    Useful products:
        Food. D. 1.
        Bait, eel-skins. D. 5.
        Leather, (eels.) D. 20.
41. CYCLOGANOIDEI. (Mud-fish, or amia.)
42. RHOMBOGANOIDEI. (Gar-pikes.)
    Useful products: Scales, used for arrow-tips. D. 14.
    Injurious traits: Enemies of other fish.
43. SELACHOSTOMI. (Paddle-fish, or spoon-bill)
44. CHONDROSTEI. (Sturgeons.)
    Useful products:
        Foods: Fresh. D. 1.
                Smoked. D. 1.
                Eggs, pickled, (caviare.) D. 3.
                Chorda-dorsalis, dried, (veziga.) D. 2.
                Isinglass, (sturgeon.) D. 24.
        Oil. D. 27, T.
        Scales. D. 14.
    Useful traits: Scavengers.
    Injurious traits: Said to destroy many of white fish.

VII. MARSIPOBRANCHIATES.

48. HYPEROARTIA. (Lamprey-eels, or nine eyes.)

49. HYPEROTRETI. (Suckers, or hags.)

Useful products: Food, (lamprey-eels.) D. 1.

Useful traits: Scavengers, (hags.)

VIII. LEPTOCARDIANS.

50. CIRROSTOMI. (Amphioxus.)

Modes of capture. D. 6.

IX. INSECTS.

51. HEXAPODA. (Bees, butterflies and moths, flies, beetles, bugs and lice, grasshoppers and crickets, dragon-flies and caddice flies.)

Useful products:

Food of aborigines.

Honey, (bees, &c.) D. 1.

Wax, (bees, &c.) D. 30.

Baits, (flies, bees, dragon-flies, beetles and their larvæ, grasshoppers, &c.) D. 5, B. 45.

Silk, (moths.) D. 8.

Coloring material, (cochineal insect, &c.) D. 29.

Blistering preparations, (Spanish-flies, &c.) D. 30.

Wings used in the arts, (beetles.) D. 19.

Useful traits:

Puncture trees, producing galls, manna, lac, &c.

Injurious traits:

Injurious to vegetation, (numerous species.)

Internal and external parasites, (flies.)

52. MYRIAPODA. (Centipedes, millipedes.)

Useful products: Food of aborigines, (eggs.) D. 1.

Injurious traits: Venomous, (centipedes, millipedes.)

X. ARACHNEANS.

53. ARACHNIDA. (Spiders, scorpions, mites, &c.)

Useful products:

Fine threads used by opticians, (spiders.)

Silk, (spiders.)

53. ARACHNIDA—Continued.

Useful traits: Destroy noxious insects, (spiders.)

Injurious traits:

Venomous, (scorpions.)

Parasites, (mites.)

XI. ARTHROPODS.

54. CRUSTACEA. (Crabs, lobsters, shrimps, prawns, crawfish, limnoria, fish-lice, lernæans, sand and water fleas, barnacles, horseshoe crabs, &c.)

Useful products:

Foods, (fresh and canned crabs, lobsters, shrimps, prawns, crawfish, lobsters.)

Baits, (crabs, lobsters, shrimps, prawns, &c.)

Manures, (horseshoe crabs.)

Useful traits: Skeleton cleaners, (beach fleas, &c.)

Injurious traits:

Parasites on fishes and marine mammals, (barnacles, fish-lice, &c.)

Destroy earthworks, dams, &c., (crawfish.)

Destroy submerged timbers, (limnoria, &c.)

Modes of protection against injurious species. E. 4.

Methods of capture. D. 7, 31, 32.

[redacted]

XIII. MOLLUSKS.

57. CEPHALOPODA. (Octopus, nautilus, argonauts, calamaries or squids.)

Useful products:

Food, (squids and their eggs.) D. 1.

Bait, fresh and salted, (octopus, squids.) D. 1, 5.

Ink, sepia, (sepias.) D. 29.

"Bone," used as food for animals. D. 5.

"Bone," used in arts and manufactures. D. 19.

58. GASTROPODA. (Land-snails, sea-snails, whelks, limpets, &c.)

Useful products:

Food, (numerous species.) D. 1, 2.

Bait, (limpets, &c.) D. 5.

Nacre, (top-shells, ear-shells, &c.) D. 15.

Shell used in arts and manufactures. D. 16.

Useful traits:

Carrion-feeders, (strombus and other siphonated genera.)

Food of useful animals.

Injurious traits:

Predatory on other mollusks, (murex, buccinum, natica, &c.)

Injurious to vegetation.

59. CONCHIFERA. (Ordinary bivalve shells.[1])

Useful products:

Food, fresh, dried, and pickled, (numerous species.) D. 1, 2, 3.

Baits, (clams, mussels, &c.) D. 5.

Pearls and nacre, (river-mussels, pearl-oysters, &c.) D. 15.

Shell used in arts and manufactures. D. 16.

Injurious traits: Borers in wood and stone, (ship-worms, pholas, gastrochæna, date, shells, saxicava, ungulina, &c.)

XIV. RADIATES.

60. ECHINODERMATA. (Sea-cucumber, sea-urchins, star-fishes, ophiurans.)

Useful products:

Food, fresh, (sea-urchins and their eggs.) D. 1.

Food, dried, (bêches le mer.)

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[1] *Tunicata, brachiopoda,* and *bryzoa* are omitted, on account of their very remote usefulness.

60. ECHINODERMATA—Continued.

Injurious traits:

Burrowers, (various echinoids.)

Destroyers of useful mollusks.

61. CŒLENTERATA. (Acalephs, polyps, &c.)

Useful products: Coral, various species of polyps.) D. 17.

Injurious traits: Clog seines, weirs, and fishing-lines, (acalephs.)

XV. PROTOZOANS.

62. RHIZOPODA. (Sponges and foraminifera.)

Useful products:

Food, "mountain meal," (foraminifera.) D. 1

Infusorial earths, (foraminifera.) D. 18.

Sponges, used in arts and manufactures. D. 26.

[redacted]

SECTION B.

(THE CHASE AND THE FISHERIES.)

MEANS OF PURSUIT AND CAPTURE.

I. HAND IMPLEMENTS OR TOOLS.

* *For striking.*

1. CLUBS:
   - *a.* Unarmed clubs:
     - Salmon-clubs, used by the Indians of the Northwest coast.
     - Other fishing-clubs.
     - Hunting-clubs.
   - *b.* Armed clubs:
     - Stone-headed clubs.
     - Clubs, armed with teeth or bone points.
     - Clubs, armed with metal points.
2. SLUNG-WEIGHTS:
   - *a.* Slung stones.
   - *b.* Slung shot.
   - *c.* ("Morning stars.")
   - *d.* ('Flails.")

** *For cutting.*

3. KNIVES:
   - *a.* Straight knives:
     - Hunting-dirks and daggers.
     - Hunting-knives, scalp-knives, &c.
     - Blubber-knives, aboriginal and recent.
     - Boarding-knives used by whalemen.
     - Whaleman's boat-knives.
     - Bowie-knives.
     - Flaying-knives, aboriginal and recent.
     - Splitting-knives.
     - Heading-knives.
     - Sailors' and fishermen's sheath-knives.
     - Hunters' sheath-knives.
     - Slivering-knives, used by fishermen.
     - Oyster-knives.

3. KNIVES—Continued.

a. Straight knives:

Mackerel rimmers or fatting knives.

(Swords, including the various forms incidentally used in hunting, sabers, cutlasses, machétes, creases, &c.)

Stone and bone knives, used by Indians and Eskimos.

Skin scrapers and parers, used in preparing leather.

b. Clasp-knives:

Sailors' clasp-knives.

Hunters' clasp-knives.

Clasp-dirks.

Jockey knives.

4. AXES:

a. Axes, proper:

Tomahawks.

Hatchets.

Whaleman's boat-hatchets.

Cleavers.

Axes, used by fishermen and hunters.

Head-axes for whalemen.

b. Cutting-spades:

Whale-spades:

Cutting-spades.

Throat-spades, flat and round shank.

[redacted]

II. IMPLEMENTS FOR SEIZURE OF OBJECT.

* *Scooping-instruments.*

6. SCOOPS.

† *For hand-use.*

a. Shovels:
- Clam-shovels.
- Trowels used in taking burrowing shore animals.
- Hand-scoops.

b. Hand-dredges, used in collecting mollusks.

c. Pile-scrapers.

†† *For use with sounding-lines.*

d. Armed leads:
- Common "deep-sea lead."
- Deep-sea-sounding apparatus.

e. Cup-leads.

f. Scoop sounding-machines.

** *Grasping-hooks.*

7. HOOKED INSTRUMENTS. (Those used with a single motion, that of hooking:)

a. Single-pointed hooks:
- Gaff-hooks.
- Boat-hooks.
- Jigs.
- Rabbit and squirrel hooks, used by the Ute Indians.
- Snake-hooks.
- Clam-hooks.
- Hoes and picks used in gathering shell-fish.
- Forks used in handling salted and dried fish.
- Whalemen's hooks:
  - Blubber-hooks.
  - Blubber-forks.
  - Junk-hooks.
  - Lance-hooks.
  - Can-hooks.

7. HOOKED INSTRUMENTS—Continued.

b. Many-pointed hooks:

Grappling-irons.
Lip hooks or grapnels, used by whalers.
Toggles, used by whalers.
Oyster-rakes.
Clam-rakes.
Oulachan rakes or spears.
Squid-jigs.

c. Twisting-rods, used in drawing small mammals from their burrows.

8. BARBED IMPLEMENTS. (Those used with two motions, the first that of thrusting:)

a. Spears with fixed heads:

Harpoons.
One-flued harpoons.
Two-flued harpoons.
Toggle-harpoons.
Harpoon-bullets. (See under 23.)
Gun-harpoons.
Other whaleman's "craft."
Barbed spears, (with single point.)
Grains, (with two prongs.)
Gigs.

[redacted]

8. BARBED INSTRUMENTS—Continued.

b. Spears with detachable heads:

Indian fish-harpoons.

Other fish-harpoons.

(For accessory apparatus, see under 29.)

9. TONGS, &c.

† *For hand use.*

a. Tongs (with two handles:)

Oyster-tongs.

Oyster-rakes.

b. "Nippers," (with cord and handle.)

Snake-tongs.

Sponge-tongs.

Coral-tongs.

†† *For use with sounding-lines.*

c. "Clamms" for deep-sea soundings, (forceps closed by a weight.)

(Ross's "Deep-sea clamms.")

(Bull-dog sounding-machine.)

*** *Grasping-lines.*

10. NOOSES.

† *Stationary nooses.*

a. Jerk-snares:

Bird-snares.

Fish snares, of wire, gut, hair, &c.

†† *Thrown nooses.*

b. Lariats and lassos:

Lariats with rope noose, made from hair, hemp, and rawhide.

Lariats with metal noose.

(Chilian bird-lariat.)

11. LOADED LINES. (Bolas.)

a. Bird-slings, used by Eskimos.

b. Bolas, with one or several weights.)

**** *Entangling lines.*

12. TANGLES.

a. Tangles:

Swab-tangles.

(Dredge-tangles, used by English collectors.)

Harrow-tangles.

Wheel-tangles.

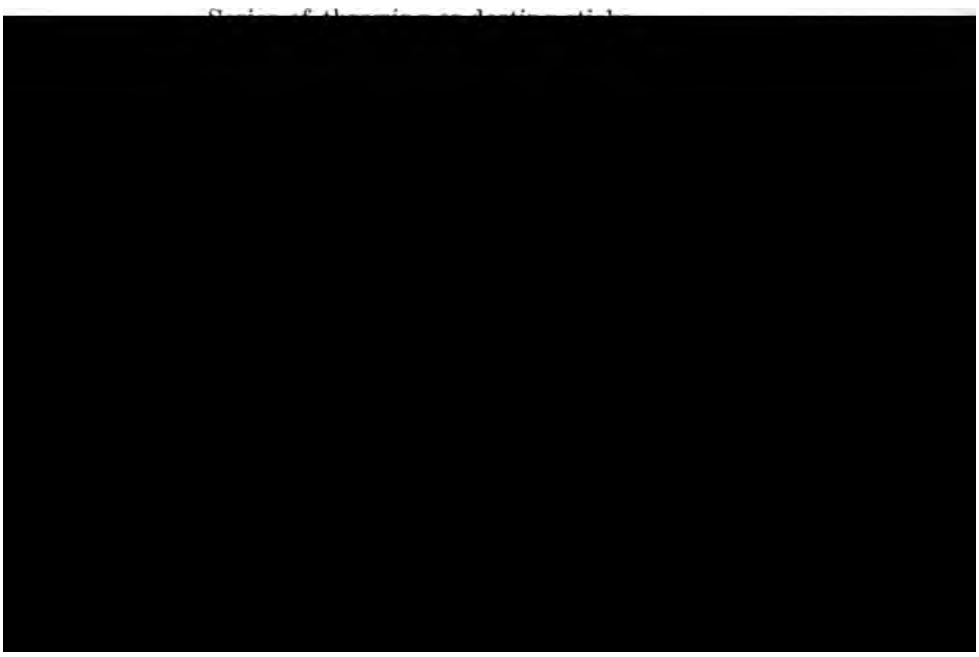
III. MISSILES.

* *Simple missiles, (those propelled by the unaided arm.)*

13. HURLED WEIGHTS.
    - *a.* Stones and discs thrown by the hand.
    - *b.* Weights dropped from an elevation, (dead-falls, not automatic.)
14. HURLED STICKS.
    - *a.* Straight sticks:
      - Clubs used as missiles.
    - *b.* Curved sticks:
      - Throw-sticks, used by the Moqui Indians of New Mexico in hunting rabbits.
      - (Boomerangs.)
15. HURLED SPEARS.
    - *a.* Darts and lances.

** *Centrifugal missiles. (Propelling power augmented by an artificial increase of the length of the arm.)*

16. SLINGS AND SPEARS THROWN BY STRAPS.
    - *a.* Slings.
    - *b.* Spears, with straps used in throwing them.
17. MISSILES PROPELLED BY "THROWING-STICKS."
    - *a.* Spears with throwing-sticks, used by Eskimos:



18. BOWS AND ARROWS—Continued.

d. Implements of manufacture:

Flint-chipping apparatus.

Arrow-head sharpeners.

Shaft-gauges.

Cord-twisting apparatus.

Shaft-polishers.

Glue-sticks, used in fastening head of arrow.

‡‡ *Spring consisting of elastic cord.*

19. INDIA-RUBBER SLINGS.

a. Pea-shooters, used in killing birds.

‡‡‡ *Spring consisting of metallic helix.*

20. SPRING-GUNS.

a. Spring-guns.

**** *Missiles propelled by the compression of air or water.*

21. AIR-GUNS.

a. Blow-guns, (missile propelled by the breath:)

Blow-guns carrying arrows.

Blow-guns carrying balls.

b. Piston air-guns.

c. Reservoir air-guns:

Air-guns.

Air-gun canes.

22. WATER-GUNS.

a. Syringe-guns:

Humming-bird guns.

***** *Fire-arms.*

23. GUNS AND PISTOLS.

a. Muzzle-loading arms:

With smooth bores:

Muskets.

Fowling-pieces.

Cane-guns.

Pistols:

Single-barreled pistols.

Revolvers.

With grooved bores: Rifles.

Rifle-muskets.

Rifle-carbines.

Pistols.

23. GUNS AND PISTOLS—Continued.

b. Breech-loading arms:

With smooth bores:

Fowling-pieces.

Pistols.

With rifled bores:

Muskets.

Hunting rifles.

Carbines:

Single-barreled carbines.

Revolving carbines.

Pistols:

Pistols.

Revolvers.

c. Whaling-guns:

Bomb lance and gun.

Harpoon ball and gun.

Harpoon-gun.

Harpoon bomb-lance gun.

24. (ACCESSORY.) AMMUNITION AND ITS PREPARATION.

a. Explosives:

Gunpowder.

Gun-cotton.

Percussion powder:

[redacted]

24. (ACCESSORY.) AMMUNITION, &c.—Continued.

b. Missiles:

Explosive bullets, shells, &c.:

Bomb-lance.

Meigs's shells.

c. Wadding:

Bulk wadding.

Prepared wads.

(Accessory) wad-cutters.

d. Ammunition-measures:

Measures.

Shot-measures. } Attached to pouches and separate.
Powder-measures. }

Weighing-scales.

e. Prepared ammunition:

Cartridges:

Ball-cartridges.

Shot-cartridges.

Wire-cartridges.

(Accessory) paper-shells.

(Accessory) metallic shells.

f. Methods of preparing cartridges:

Loaders.

Crimpers.

Cappers.

25. ACCESSORIES OF LOADING, CLEANING AND REPAIRING, SIGHTING, AND TESTING FIRE-ARMS.

a. Instruments for cleaning, loading, &c.:

Rammers.

Swabs.

Charge-drawers, "worms."

b. Sights, &c.:

Muzzle-sights:

Plain sights.

Slit-sights.

Globe-sights.

Peep-sights.

Breech-sights:

Plain sights.

Graduating sights.

25. ACCESSORIES OF LOADING, &c.—Continued.

b. Sights, &c.:

Telescope-sights.

Levels, attached to guns

Wind-gauges.

c. Targets:

Practice-targets.

"Gyro-trap" targets.

Pigeon-traps and accessories of pigeon-shooting.

d. Recoil-checks.

26. FOR CARRYING ARMS AND AMMUNITION.

a. Ammunition-holders:

Powder-holders:

Horns.

Flasks.

Canisters.

Shot-holders:

Pouches.

Belts.

Cartridge-holders:

Pouches.

Boxes.

Belts.

Vests.

[redacted]

IV. BAITED HOOKS. ANGLING-TACKLE.

27. HOOKS WITH MOVABLE LINES.

a. Tackle for surface-fishing:

Fly-fishing tackle.

Salmon-tackle.

Trout-tackle.

Black-bass tackle.

Shad-tackle.

Trolling-tackle:

Trolling-tackle.

Whiffing-tackle.

Drailing-tackle.

Gangs of hooks for minnow-bait.

Surf-tackle for throwing and hauling:

Striped-bass tackle.

Redfish or bass tackle.

Bluefish tackle.

Tide-drailing tackle:

Pasque and cuttyhunk bass-tackle.

b. Tackle for fishing below the surface:

Short hand-gear:

Mackerel-gear.

Deep-sea gear:

Cod-gear.

Halibut-gear.

Flounder-gear.

Shark-gear.

Tautog-gear.

Other bottom-gear.

Bobs:

Eel-bobs.

28. HOOKS, WITH STATIONARY LINES.—SET TACKLE.

a. Surface lines:

Spilliards, or floating-trawl lines.

b. Bottom-set lines:

Trawl-lines, or bull-tows.

29. (ACCESSORY.) PARTS AND ACCESSORIES OF ANGLING-APPARATUS AND OF HARPOON AND SEINE LINES.

a. Hooks, including a full series of unmounted hooks, of recent and aboriginal manufacture.

Plain hooks:

Fly-hooks.

Trout-hooks.

Salmon-hooks.

Cod and halibut hooks.

Hooks for general use.

Bass-hooks.

Jigs and drails:

Mackerel-jigs.

Blue-fish drails of bone and metal of the various patterns, Newport, Noank, Providence, Provincetown, &c.

Block Island drails.

Pearl-squids of various patterns.

Bone-squids.

Metal-squids.

Petticoat-squids of flannel, &c.

Spoon-baits, plain and fluted:

Bass-spoons.

Pickerel-spoons.

Trout-spoons.

[redacted]

29. (ACCESSORY.) ANGLING-APPARATUS, &c.—Continued.

b. Lines, (twisted and plated:)

Gut-lines.

Lines made from sea-weed, (*Nereocystis Lütkeana*,) and used by natives of Alaska.

(Lines of sea-weed, (*Chorda filum*,) used similarly in Scotland.)

(Accessory.) Apparatus for twisting lines.

c. Snoods, leaders, and traces:

"Cat-gut," (sheep,) snoods, and leaders.

Silk-worm-gut snoods.

Salmon-gut snoods.

Flax-snoods.

Gimp-snoods.

Wire-snoods.

"Sid-straps."

d. Whalers' chains and lines:

Head chains and ropes.

Fin-chains.

Fluke chains and rings and ropes.

Head pike and ring.

(Accessory.) Blocks, pendants, cutting-blocks, &c.

e. Sinkers:

Boat-shaped sinkers, plain and shearing.

Pipe-lead sinkers.

Bullet-sinkers.

Plummet-sinkers, sugar-loaf, pear-shaped, and double-taper.

Banker-sinkers.

Seine-sinkers, of chain, lead balls, lead rings, stone, &c.

(Accessory.) Molds for sinkers.

Jig-molds.

Other sinker-molds.

f. Spreaders:

Chopsticks.

One-armed chopsticks, or "revolving booms."

g. Floats:

Line-floats of wood, cork, and quill.

Harpoon-floats of bladder, inflated skin, and wood.

Seine-floats of cork, wood, glass, and rubber-tubing.

Keg and other floats for lobster-pots, gill-nets, &c.

Whale-line drag.

29. (ACCESSORY.) ANGLING-APPARATUS, &c.—Continued.

h. Reels:

Simple reels for fly-fishing, with and without check.
Multiplying reels for bass-fishing, with and without check.
Other multiplying reels.
Gunwale-winches.
Dredge-line rollers.
Trawl-line rollers.
Seine-windlasses.

i. Line-holders:

Winders.
Spools.
Whaleman's line-tub.
Tubs for trawl-lines.
Seine-reels.

k. Rods:

Straight rods, of cane, wood, whalebone, &c.:

Salmon-rods.
Trout-rods.
Bass-rods.
Pickerel-rods.
Other rods.
Folding-rods.
Tips of rubber, whalebone, &c.

[redacted]

V. NETS.

30. ENTANGLING-NETS.

a. Meshing-nets, (entangling in meshes:)

‡ BARRIER-NETS.

Rabbit-nets, used by Indians of the Southwest.
Bird mesh-nets.
Gill-nets, used in great lakes.

‡ DRIFT-NETS.

† *Those drifting across the tide.*

Shad gill-nets, used in southern rivers.
Bass gill-nets.
Salmon gill-nets.
Mullet gill-nets.

†† *Those drifting along the tide.*

Mackerel gill-nets.
Herring gill-nets.

b. Pocket-nets, (entangling in pockets:)

Trammel-nets.

31. ENCIRCLING-NETS.

a. Seines:

Seal-seines.
Manatee-seines.
Shad-seines.
Mullet-seines.
Menhaden-seines.
Bass-seines.
Blue-fish seines.
Capelin-seines.
Herring-seines
Cod-seines.
Lance-bunts.
Baird collecting-seines.
Bait-seines.
"Fly-tail" seines of North Carolina.

b. Hoop-nets:

Handle, or dip-nets:

Bull-nets, (worked with ropes and blocks.)

31. ENCIRCLING-NETS—Continued.

b. Hoop-nets:

Handle or dip-nets:

Scoop-nets, (herring-nets, pound-scoops, car-scoops, &c.)

Landing-nets.

Eskimo auk-nets.

Baited hoop-nets:

Crab-nets.

c. Trailing-nets:

Trawls:

Beam-trawl.

(Otter-trawl.)

Dredges:

Flange, or ordinary dredge.

Rake-dredge.

Oyster-scraper.

(Coral-dredge.)

Towing-nets:

Surface tow-nets.

d. Folding or jerk nets:

Purse-nets:

Mackerel purse-seines, (pursed by weight.)

Menhaden purse-seines, (pursed by hand-ropes.)

Cast-nets:

[redacted]

VI. TRAPS.

32. PEN-TRAPS.

a. Pocket-traps:

Pitfalls:

Pits, covered.

Barrel-traps.

Jar mole-traps.

"Rabbit-tipe," used in England.

Salmon-baskets, (Columbia River.)

Salmon-weirs, (Upper Columbia River.)

River-weirs, with pockets:

Eel-traps.

Fish-slides:

Shad-slides, used in the rivers of North Carolina.

b. Labyrinth-traps:

Corrals.

Turkey-traps.

Weirs, or pounds:

Heart-pound.

Salmon-weir.

Virginia Indian weir, (figured by DeBry.)

Salmon hook-gill-net of the Saint Lawrence.

Funnel-traps:

Fish-pots.

Lobster-pots.

Eel-weirs, (with leaders.)

Eel-pots, (without leaders.)

Barrel-pots, for eels.

West India wicker fish-pots.

Set-nets.

Fykes, (set-nets with leaders.)

Bass-traps.

c. Door-traps:

† *Closed by the falling of a door.*

Box-traps.

Rabbit-traps, (figure 4.)

Brick traps, (figure 4.)

32. PEN-TRAPS—Continued.

c. Door-traps:

Box-traps:

Musquash traps, with hanging doors.

Rabbit-traps, for mouth of burrows.

Self-setting box-traps.

Double box-traps.

Spring-door traps.

†† *Closed by falling of whole trap.*

Bowl-traps.

Cob-house bird-traps.

Pigeon-nets.

††† *Closed by falling of tide.*

Bar-weirs.

d. Sheaf-traps:

Sheaf-traps, (New York Harbor.)

33. CLUTCHING-TRAPS.

a. Noose-traps:

Snares:

Footpath-snares.

Barrier-snares.

Springes.

34. FALL-TRAPS.
    a. Crushing-traps:
        Deadfalls.
        Figure-four traps.
    b. Piercing-traps:
        Spear-falls.
        Mole-traps.
        Harpoon-traps.
    c. Spring-hooks:
        Pickerel-hooks.
35. MISSILE-TRAPS.
    a. Cross-bow traps.
    b. Spring-guns.
36. ADHESIVE PREPARATIONS.
    a. Bird-lime, &c.
    b. Hoods, boots, &c.

VII. APPARATUS FOR WHOLESALE DESTRUCTION.

37. POISONS.
    a. Food poisons:
        Phosphorus poisons.
        Strychnine.
        Arsenic.
        Corrosive sublimate.
        Cyanide of potassium.
        Opium poisons.
    b. Blood poison: Woorara
38. ASPHYXIATORS.
    a. Apparatus for smoking-out.
    b. (Apparatus for suffocating with fumes of sulphur.)
    c. Apparatus for drowning-out.
39. TORPEDOES.
39½. STOMACH-SPRINGS.
    a. Eskimo whalebone springs, used in killing bears.

VIII. HUNTING-ANIMALS.

40. HUNTING-MAMMALS.
    a. Dogs.
    b. Hunting-leopard. (*Cynailurus jubatus.*)

40. HUNTING-MAMMALS—Continued.

c. Weasels and ferrets.

d. Otters.

41. ACCESSORIES TO HUNTING-DOGS.

a. Dog-whips.

b. Dog-whistles.

c. Dog-collars.

d. Dog-food.

e. Dog-carts.

f. Dog-muzzles.

42. HUNTING-BIRDS.

a. Falcons.

b. Owls.

c. Cormorants, (*Carbo sinensis*, used in fishing in China.)

43. ACCESSORY TO HUNTING-BIRDS.

a. Hoods.

b. Perches.

c. Cormorant-collars.

44. HUNTING-FISHES.

a. Remora, used in West Indies and Australia.

IX. DECOYS AND DISGUISES.

45. BAITS.

a. Natural baits:

[redacted]

45. BAITS—Continued.

a. Natural baits:

(Accessory) methods of preparing baits:

Bait-cutters.

Bait-mills.

Bait-ladles.

Wheelbarrows for bait-clams, (Nantucket.)

Bait boxes and cans.

Bait-needles.

b. Artificial baits:

Trolling-spoons.

Spinners.

Squids and jigs.

"Bobs," used in southern waters.

Artificial flies.

c. Accessory to *b*:

a. Fly-books.

b. Raw materials for making artificial flies.

c. Tools for making artificial flies.

d. Pastes.

46. DECOYS.

a. Scent-decoys.

b. Sound-decoys:

Animal calls, whistles, &c.

Bird-calls.

c. Sight-decoys:

Living decoy animals and birds.

Decoy-dogs, used in hunting ducks.

Stool-pigeons.

Tame decoy-ducks.

Tame decoy-brants.

Imitations of animals and birds:

Decoy swimming-birds.

Decoy-waders.

Imitations of fishes:

Lure-fish used in taking Mackinaw trout.

Blanket-decoys, (for antelopes.)

Lanterns and other apparatus for fire-hunting and fishing,

Lanterns for still-hunting.

46. DECOYS—Continued.

c. Sight-decoys:

Lanterns for weequashing, or fire-fishing, for eels.

Jack-lanterns for fishing.

47. COVERS.

a. Movable covers:

Masks:

Deer heads and antelope heads.

Movable copses.

Covers for hunter.

Covers for boats.

b. Stationary covers:

Hunting-lodges.

X. PURSUIT, ITS METHODS AND APPLIANCES.

48. METHODS OF TRANSPORTATION.

a. Personal aids:

Snow-shoes.

Skates.

Alpenstocks and staves.

Portable bridges.

b. Animal equipments:

Harness:

Horse-trappings.

48. METHODS OF TRANSPORTATION—Continued.

c. Boats:

Hunting-boats, fishing-boats:

Birch canoes.
Canoes used by Indians of the northwest coast in whaling.
Kyaks or bidarkas.
Umiaks or bidarras.
Indian raft-boats.
Launches.
Dug-outs.
Portable (paper and canvas) boats.
Duck-boats.
Scows.
Oyster-boats.
Whale-boats.
Seine-boats, (sea use.)
Seine-boats of the lakes.
Potomac seine-boats.
Dorys, sharpies, and dingies.
Pound-boats of the lakes.
Italian fishing-boats, (California.)
Pinkies, (Martha's Vineyard.)
Adirondack boats.
Alexandria Bay boats.
Surf-boats.
Whitehall boats.
Oyster-canoes.
Ducking-boats.
Cat-rigged fishing-boats.
Mackerel-smacks.
Oyster-smacks.
Menhaden-smacks.
Menhaden-carryaways.
Bank cod-smacks.
Smacks with wells, used near the coast.
Smacks employed in fish-trade.
Whale-ships.
Sealers.

48. METHODS OF TRANSPORTATION—Continued.

c. Boats:

- Herring-boats.
- Mackinaw boats. } Used in the Great Lake fisheries.
- Huron boats. } Used in the Great Lake fisheries.
- Norwegian boats. } Used in the Great Lake fisheries.
- Pound-boats. } Used in the Great Lake fisheries.
- Oyster-pungies, (canoe and square-sterned,) employed on the Chesapeake.
- Oyster police-boats.

Steamers:

- Mackerel-steamers.
- Menhaden steam-mills.
- Lake gill-net steamer.
- Whale-steamers.
- Sealing-steamers, &c.

Accessory to fishing-vessels:

- Rigging, masts, sails, cordage, pulleys, sockets.
- Anchors, killicks, chains.
- Sail-needles, palms, fids, marline-spikes.
- Oar-locks, chocks, oar-rests.
- Stepping-irons for whale-boats.
- Crotches and oar-rests.
- Paddles and oars.

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49. CAMP-OUTFIT—Continued.

b. Furniture:

Hammocks.
Beds, couches, stretchers, and lounges.
Blankets, rubber and Mackinaw, and fur robes.
Fuel.
Apparatus for kindling fire.
Lamps and lanterns.
Tools.

c. Commissary supplies:

Cooking-apparatus, kettles, and stoves.
Table-furniture.
Preserved meats, &c.

50. PERSONAL EQUIPMENTS.

a. Clothing:

Hunting-suits.
Cloth-suits.
Skin-suits.
Water-proof suits.
Oil-skin suits.
Boots, moccasins, leggings.
Water-proof boots.
Wading boots and stockings.
Riding-boots.
Moccasins.
Leggings.
Hats and caps.
Protection from insects:

Nets for beds and for face.
Ointments, (such as tar and sweet-oil.)
Smudges, (such as pyrethrum powder.)
Shields, breastplates, and defensive armor.

b. Trappings:

Belts.
Cross-belts.
Game-bags.
Game and fish baskets and slings.
Wallets for lines and other tackle.

50. PERSONAL EQUIPMENTS—Continued.

c. Optical instruments, &c.:

Snow-goggles.

Telescopes.

Field-glasses, &c.

Water-telescopes.

d. Medical outfit:

Medicine-chests.

Hunters' and fishermen's flasks.

e. Artificial lights:

Lanterns for camp and ship use.

Torches.

SECTION C.

METHODS OF PREPARATION.

I. PREPARATION AND PRESERVATION OF FOOD

1. PRESERVATION DURING LIFE, (see under E, 3.)
2. PRESERVATION OF FRESH MEATS.
   - *a.* Refrigerators:
     - Ice-boxes and refrigerators.
     - Refrigerator-cars.
     - (Accessory.) The ice-trade:
       - Ice cutting and handling apparatus.
       - Methods of manufacturing artificial ice.
       - Ice-houses.
   - *b.* Other accessories of preservation:
     - Meat-hooks.
     - Skewers, &c.
     - Carving-tools.
3. PRESERVATION BY DRYING.
   - *a.* Sun-drying apparatus:
     - Beach dryers.
     - Flake-drying:
       - Newfoundland flakes.
       - Massachusetts flakes.
       - Covers for fish-drying.
   - *b.* Smoke-drying apparatus:
     - Herring smoke-houses.
     - Halibut smoke-houses.
     - Salmon smoke-houses.
     - Sturgeon smoke-houses.
     - Aboriginal drying-houses.
     - Methods of drying haliotis, used by the Indians of California.

4. PRESERVATION BY CANNING AND PICKLING.

a. Salting fish:

Knives, (see under B, 2.)

Scaling-apparatus.

Tables, tubs, &c.

Barrels.

(Accessory.) Salt:

Specimens of the salts used in preserving fish.

Model of salt-mills used on Cape Cod in former days.

b. Canning meats:

Model of salmon-canning establishment.

Model of sardine-factory.

(Accessory.) Cotton-oil, and its manufacture.

Model of lobster-canning factory.

Model of oyster-canning factory.

5. PREPARATION OF BAITS.

a. Bait-mills, knives, choppers, &c., (see under B, 2 and 3.)

b. Bait tubs, vats, &c.

II. MANUFACTURE OF TEXTILE FABRICS, FELTS, AND STUFFINGS.

6. PREPARATION OF WOOL AND HAIR OF MAMMALS.

a. Preparation of wool cloths:

[redacted]

6. PREPARATION OF WOOL, &c.—Continued.

c. Felting and the hat manufacture:

Rolling-off.

Shaping.

d. Preparation of curled hair for stuffings.

7. PREPARATION OF WHALEBONE.

a. Preparation of stuffings.

8. PREPARATION OF FEATHERS.

a. Preparation of down for stuffings.

b. Preparation of feather fabrics.

c. Preparation of "brillantine."

d. Preparation of flocking for wall-paper, from refuse quills.

e. Preparation of fibres for manufacture of plush carpets.

9. PREPARATION OF SILK OF INSECTS.

a. Preparation of silk of silk-worms:

Boiling the cocoons.

Reeling.

Spinning.

Dyeing.

Weaving.

10. PREPARATION OF SOFT PARTS OF OTHER INVERTEBRATES.

a. Preparation of silk from byssus of *Pinna.*

b. Preparation of sponge stuffing.

III PREPARATION OF THE SKIN AND ITS APPENDAGES.

11. CURRYING OF LEATHER.

a. Processes of currying:

Dipping.

Graining.

Scraping.

Dressing.

b. Implements employed by curriers:

"Head-knives."

"Pommels."

"Stretching-irons."

"Round-knives."

"Cleaners."

11. CURRYING OF LEATHER—Continued.

b. Implements employed by curriers:

"Maces."

"Horses," or trestles.

"Dressers."

"Treading-hurdles."

c. Eskimo and Indian currying methods and implements.

d. Methods of dressing gut and sinew.

12. LEATHER-DRESSING.

a. Processes of tanning leather:

Soaking.

Liming.

Tanning.

b. Processes of tawing or oil-dressing leather:

Soaking.

Liming.

Oiling.

c. Apparatus of leather-dressing, recent and aboriginal.

13. FUR-DRESSING.

a. Processes of fur-dressing:

Currying. (See under 12.)

Scouring.

Tanning.

Lustering.

[redacted]

15. MANUFACTURE OF QUILL ARTICLES—Continued.
    - *a.* Manufacture of quills for pens:
        - Dyeing.
        - Shaping.
    - *b.* Manufacture of tooth-picks.
    - *c.* Manufacture of floats and other articles.
    - *d.* Manufacture of quill brush-bristles.
16. HAIR AND WOOL WORK.

IV. PREPARATION OF HARD TISSUES.

17. IVORY CUTTING AND CARVING.
    - *a.* Manufacture of handles, trinkets, billiard-balls, &c.:
        - Turning and sawing.
        - Polishing.
        - Bleaching.
    - *b.* Manufacture of organ and piano keys:
        - Sawing.
        - Strip-sawing.
        - Polishing.
        - Bleaching, &c.
    - *c.* Other processes.
18. PREPARATION OF HORN AND HOOF.
    - *a.* Steaming.
    - *b.* Pressing.
19. PREPARATION OF WHALEBONE.
    - *a.* Cutting and other processes.
    - *b.* Manufacture of whip-makers' stock and whips.
    - *c.* Manufacture of umbrella-maker's bone.
    - *d.* Manufacture of ribbon-weaver's bone.
    - *e.* Manufacture of hat and bonnet maker's bone.
    - *f.* Manufacture of suspender-maker's bone.
    - *g.* Manufacture of stock-maker's bone.
    - *h.* Manufacture of dress and stay maker's bone.
    - *i.* Manufacture of billiard-table cushions.
    - *k.* Manufacture of surgical instruments.
    - *l.* Manufacture of whalebone-brushes.
    - *m.* Manufacture of rosettes, woven-work, and trinkets.
    - *n.* Other whalebone manufactures.
20. PREPARATION OF TORTOISE-SHELL.

21. PREPARATION OF FISH-SCALE WORK.
22. PREPARATION OF NACRE.
23. PREPARATION OF CORAL.
24. PREPARATION OF OTHER HARD TISSUES

V. OILS AND GELATINES.

25. EXTRACTION OF WHALE-OIL, (WITH MODELS OF TRY-WORKS, CLARIFYING-VATS, &c.)
    - *a.* Preparation of body-oil:
        - Cutting in and stowing.
        - Leaning and mincing.
        - Trying.
        - Bailing.
        - Cooling.
        - Barreling.
        - Refining.
    - *b.* Preparation of head-oil.
    - *c.* Preparation of spermaceti.
    - *d.* Instruments and appliances of rendering whale-oil:
        - Boarding-knives.
        - Leaning-knives.
        - Mincing-horse and mincing-knives.
        - Mincing-tub.
        - Mincing-machine.
        - Blubber-fork.

VI. DRUGS, PERFUMES, AND CHEMICAL PRODUCTS.

30. MANUFACTURE OF PERFUMES.
31. MANUFACTURE OF IVORY-BLACK.
32. MANUFACTURE OF PRUSSIATES.
33. MANUFACTURE OF MUREXIDES.
34. PREPARATION OF COCHINEAL COLORS.
35. MANUFACTURE OF INKS FROM ANIMAL SUBSTANCES.
36. PREPARATION OF ALBUMEN.
37. MANUFACTURE OF PEPSIN.
38. MANUFACTURE OF PHOSPHORUS.
39. MANUFACTURE OF SAL AMMONIAC.
40. MANUFACTURE OF AMMONIA.
41. MANUFACTURE OF ALBUMEN PREPARATIONS.
42. MANUFACTURE OF PROPYLAMINE.
43. MANUFACTURE OF FORMIC ACID.
44. MANUFACTURE OF CARBAZOTATES.

VII. MANUFACTURE OF FERTILIZERS.

45. PREPARATION OF GUANO.
    a. Model of fish-guano works:
        Grinders and pulverizers.
        Mixers.
        Guano in its various stages, with its ingredients, South Carolina phosphates, Navassa phosphates, scrap, (crude, and dried,) sulphuric acid, kainite, screened and unscreened guano, and sea-weed used in preparation.

VIII. LIMES.

46. BURNING OF LIME.
    a. Models of kilns for burning shells.

IX. PRESERVATION OF THE ANIMAL FOR SCIENTIFIC USES.

47. APPARATUS FOR MAKING AND PRESERVING ALCOHOLIC SPECIMENS.
    a. Tanks and jars:
        Agassiz collecting-tank.

47. APPARATUS FOR MAKING AND PRESERVING ALCOHOLIC SPECIMENS—Continued.

a. Tanks and jars:

Army collecting-tank.

Museum storage-tank, Agassiz model.

Anatomical jars.

Self-sealing jars, used in collecting.

Phials.

Tube-phials.

b. Syringes for injecting.

c. Inflatable bags.

d. Preservative mixtures:

Alcohol.

Glycerine.

Carbolic acid.

Chloral hydrate.

Picric acid.

Osmic acid.

e. Labels:

Metallic labels.

Parchment labels.

Indelible inks, pencils, &c.

48. APPARATUS FOR PRESERVING AND MAKING SKELETONS.

a. Preparation of the bones:

[redacted]

49. APPARATUS FOR MAKING CASTS, &c.—Continued.

b. Frames and modeling tools.

c. Molds:

Of plaster.

Of gelatine.

Of paper.

Of paraffine.

50. APPARATUS AND METHODS OF MAKING AND MOUNTING SKINS. TAXIDERMY.

a. Tools:

Flaying-tools.

Scraping-tools.

Taxidermists' tools for stuffing:

Forceps.

Pliers.

b. Preservatives and insect-powders:

Arsenic and arsenical soap.

Corrosive sublimate.

Salt, alum, &c.

Persian insect-powder.

Syringes for application of insect-powder.

Tobacco, snuff, used as preservatives.

c. Frames, &c.:

Wooden frames.

Wire frames.

Plaster model-bodies.

51. (ACCESSORY.) PHOTOGRAPHIC AND OTHER DELINEATING APPARATUS.

a. Photographic apparatus:

Lenses.

Cameras and fittings.

Camera tripods and stands, with model.

Fish Commission stands.

Plates, and their results:

Wet plates.

Dry plates.

Dark closets.

b. Camera obscuras.

c. Mechanical delineators.

d. Methods of heliotyping and engraving illustrations.

SECTION D.

ANIMAL PRODUCTS AND THEIR APPLICATIONS.

I. FOODS.

1. FOODS IN A FRESH CONDITION.

This section may include specimens of the marketable animals in a fresh condition in refrigerators.

For convenience in making up and arranging this portion of the collection, a list is appended of the animals used as food in the United States. Many others are available, but for various reasons are not commonly eaten.

a. Mammals:

Grizzly bear, (*Ursus horribilis.*)
Black bear, (*Ursus americanus.*)
White bear, (*Thalarctos maritimus.*)
Raccoon, (*Procyon lotor.*)
Buffalo, (*Bison americanus.*)
Musk-ox, (*Ovibos moschatus.*)
Mountain goat, (*Mazama montana.*)
Mountain sheep, (*Ovis montana.*)
Antelope, (*Antilocapra americana.*)
Moose, (*Alces malchis.*)
Woodland caribou, (*Tarandus rangifer*, subsp. *caribou.*)
Barren-ground caribou, (*Tarandus rangifer*, subsp. *grœnlandicus.*)
Elk or wapiti, (*Cervus canadensis.*)
Virginia deer, (*Cariacus virginianus.*)
Mule-deer, (*Cariacus macrotis.*)
Black-tailed deer, (*Cariacus columbianus.*)
Peccary, (*Dicotyles torquatus.*)
Manatee, (*Trichechus manatus.*)
Fox squirrel, (*Sciurus cinereus.*)
Gray squirrel, (*Sciurus carolinensis.*)

1. FOODS IN A FRESH CONDITION—Continued.

a. Mammals:

California gray squirrel, (*Sciurus fossor.*)
Tuft-eared squirrel, (*Sciurus Aberti.*)
Red squirrel, (*Sciurus hudsonius.*)
Flying squirrel, (*Sciuropterus volucella.*)
Woodchuck, (*Arctomys monax.*)
Marmots, (*Arctomys caligatus* and *flaviventer.*)
Polar hare, (*Lepus timidus*, var. *arcticus.*)
Prairie hare, (*Lepus campestris.*)
Northern hare or white rabbit, (*Lepus americanus*, and *L. americanus* var. *virginianus.*)
Red hare, (*Lepus americanus*, var. *Washingtoni.*)
Baird's hare, (*Lepus americanus*, var. *Bairdii.*)
Gray hare or gray rabbit, (*Lepus sylvaticus.*)
Sage rabbit, (*Lepus sylvaticus*, var. *Nuttalli.*)
Audubon's hare, (*Lepus sylvaticus*, var. *Auduboni.*)
Trowbridge's hare, (*Lepus Trowbridgei.*)
Jack rabbit or mule rabbit, (*Lepus callotis.*)
California hare, (*Lepus californicus.*)
Marsh hare, (*Lepus palustris.*)
Water hare, (*Lepus aquaticus.*)
Opossum, (*Didelphys virginiana.*)

b. Birds:

[redacted]

1. FOODS IN A FRESH CONDITION—Continued.

b. Birds:

California partridge, (*Lophortyx californicus.*)
Gambel's partridge, (*Lophortyx Gambeli.*)
Scaled partridge, (*Callipepla squamata.*)
Massena partridge, (*Cyrtonyx massena.*)
Black-billed plover, (*Squatarola helvetica.*)
Golden plover,(*Charadrius fulvus* var. *virginicus.*)
Kildeer plover, (*Aegialitis vociferus.*)
Wilson's plover, (*Aegialitis wilsonius.*)
Ringneck plover, (*Aegialitis semipalmatus.*)
Piping plover, (*Aegialitis melodus.*)
Stilt sandpiper,(*Micropalama himantopus.*)
Ruddy plover, (*Calidris arenaria.*)
Woodcock, (*Philohela minor.*)
American snipe, (*Gallinago wilsoni.*)
Red-breasted snipe, (*Macrorhamphus griseus.*)
Willet, (*Totanus semipalmatus.*)
Tell-tale, (*Totanus melanoleucus.*)
Yellow-shanks, (*Totanus flavipes.*)
Upland plover, (*Actiturus bartramius.*)
Long-billed curlew, (*Numenius longirostris.*)
Hudsonian curlew, (*Numenius hudsonicus.*)
Eskimo curlew, (*Numenius borealis.*)
Clapper rail, (*Rallus longirostris.*)
Marsh hen, (*Rallus elegans.*)
Virginia rail, (*Rallus virginianus.*)
Carolina rail, (*Porzana carolina.*)
Yellow rail,(*Porzana noveboracensis.*)
Trumpeter-swan, (*Cygnus buccinator.*)
Whistling swan, (*Cygnus americanus.*)
White-fronted goose, (*Anser albifrons.*)
Snow goose, (*Anser hyperboreus.*)
Brant, (*Branta bernicla.*)
Canada goose, (*Branta canadensis.*)
Mallard, (*Anas boschas.*)
Black duck, (*Anas obscura.*)
Pintail duck, (*Dafila acuta.*)
Gray duck, (*Chaulelasmus streperus.*)

1. FOODS IN A FRESH CONDITION—Continued.

b. Birds:

Widgeon or bald pate, (*Mareca americana.*)
Green-winged teal, (*Querquedula carolinensis.*)
Blue-winged teal, (*Querquedula discors.*)
Red-breasted teal, (*Querquedula cyanoptera.*)
Shoveller, (*Spatula clypeata.*)
Wood duck,(*Aix sponsa.*)
Big black-head, (*Fuligula marila.*)
Little black-head, (*Fuligula affinis.*)
Ring-necked duck, (*Fuligula collaris.*)
Red-head, (*Fuligula ferina*, var. *americana.*)
Canvas-back, (*Fuligula vallisneria.*)
Golden-eye, (*Bucephala clangula.*)
Barrow's golden-eye, (*Bucephala islandica.*)
Butter-ball, (*Bucephala albeola.*)
Long-tail duck, (*Harelda glacialis.*)
Harlequin-duck, (*Histrionicus torquatus.*)
Eider duck, (*Somateria mollissima.*)
King eider, (*Somateria spectabilis.*)
Scoter, (*Œdemia americana.*)
Velvet duck, (*Œdemia fusca*, var. *velvetina.*)
Surf duck, (*Œdemia perspicillata.*)
Long-billed scoter, (*Œdemia perspicillata* var. *Trowbridgei.*)

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1. FOODS IN A FRESH CONDITION—Continued.

d. Amphibians:

Frogs, (*Rana catesbiana, clamitans*, &c.)

e. Fishes, (eastern coast:)

File fish, (*Balistes capriscus.*)
American sole, (*Achirus lineatus.*)
Flat fish, (*Pseudopleuronectes americanus.*)
Smooth flounder, (*Pleuronectes glaber.*)
Sand flounder, (*Lophopsetta maculata.*)
Flounder, (*Chænopsetta ocellaris.*)
Southern flounder, (*Chænopsetta dentata.*)
Four-spotted flounder, (*Chænopsetta oblonga.*)
Halibut, (*Hippoglossus americanus.*)
Newfoundland "Turbot," (*Reinhardtius hippoglossoides.*)
Pollack, (*Pollachius carbonarius.*)
Cod, (*Gadus morrhua.*)
Tom-cod, or frost fish, (*Microgadus tomcodus.*)
Haddock, (*Melanogrammus æglefinus.*)
Hake, (*Phycis chuss.*)
Squirrel hake, (*Phycis tenuis.*)
Cusk, (*Brosmius americanus.*)
Whiting, (*Merlucius bilinearis.*)
Norway haddock, (*Sebastes norvegicus.*)
Rose fish, (*Sebastes viviparus.*)
Tautog, or black-fish, (*Tautoga onitis.*)
Chogset, or cunner, (*Tautogolabrus adspersus.*)
Hog fish, (*Lachnolæmus falcatus.*)
Angel fish, (*Holacanthus ciliaris.*)
Sword fish, (*Xiphias gladius.*)
Spear fish, (*Tetrapturus albidus.*)
Sail fish, (*Histiophorus americanus.*)
Mackerel, (*Scomber scombrus.*)
Chub mackerel, (*Scomber colias.*)
Bonito, (*Sarda pelamys.*)
Horse mackerel, (*Orcynus secundi-dorsalis.*)
Spanish mackerel, (*Cybium maculatum.*)
Cero, (*Cybium caballa.*)
Striped cero, (*Cybium regale.*)
Crevallé. (*Carangus hippos* and *Paratractus pisquetus.*)

1. FOODS IN A FRESH CONDITION—Continued.

e. Fishes, (eastern coast:)

Pompano, (*Trachynotus carolinus.*)
Short pompano, (*Trachynotus ovatus.*)
Butter-fish, (*Poronotus triacanthus.*)
Squeteague, (*Cynoscion regalis.*)
Spotted squeteague, (*Cynoscion carolinensis.*)
Drum, (*Pogonias chromis.*)
Spot, (*Liostomus obliquus.*)
Silver perch, or yellow-tail, (*Bairdiella punctata.*)
Red fish, or spotted bass, (*Sciænops ocellatus.*)
King fish, (*Menticirrus nebulosus.*)
Southern king fish, or Bermuda whiting, (*Menticirrus albur nus.*)
Croaker, (*Micropogon undulatus.*)
Sailor's choice, (*Lagodon rhomboides.*)
Sheeps-head, (*Archosargus probatocephalus.*)
Scuppaug, or porgy, (*Stenotomus argyrops.*)
Grunts, (*Hæmulon arcuatum*, &c.)
Gray snapper, (*Lutjanus caxis.*)
Red snapper, (*Lutjanus aya.*)
Grouper, (*Epinephelus morio.*)
Spotted grouper, (*Epinephelus guttatus.*)
Jew fish, (*Promicrops guasa.*)

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1. FOODS IN A FRESH CONDITION—Continued.

e. Fish, (eastern coast:)

Sea trout, (*Salmo immaculatus.*)
Tarpum, (*Megalops thrissoides.*)
Menhaden, (*Brevoortia menhaden.*)
Shad, (*Alosa sapidissima.*)
Alewife, or gaspereau, (*Pomolobus pseudoharengus.*)
Tailor herring, (*Pomolobus mediocris.*)
Herring, (*Clupea harengus*)
Mud shad, (*Dorosoma cepedianum.*)
Anchovy, (*Engraulis vittatus*, &c.)
Sea eel or conger, (*Conger oceanica.*)
Eel, (*Anguilla bostoniensis.*)
Sturgeon, (*Acipenser oxyrhynchus* and *A. brevirostris.*)
Lamprey eel, (*Petromyzon americanus.*)

f. Fishes, (fresh waters:)

Burbot or lawyer, (*Lota maculosa.*)
Fresh-water drum, (*Haploidonotus grunniens.*)
Small-mouthed black-bass, (*Micropterus salmoides.*)
Large-mouthed black-bass, (*Micropterus floridanus.*)
Rock-bass, (*Ambloplites rupestris.*)
Sacramento "perch," (*Archoplites interruptus.*)
Sun-fish, (*Pomotis aureus.*)
Black-eared sunfish, (*Pomotis auritus.*)
"Bream" of Southern States, (*Calliurus*, *Lepomis*, *Enneacanthus*, *Chænobryttus*, numerous species.)
Strawberry or grass bass, (*Hyperistius hexacanthus*, and *Pomoxys storerius.*)
Yellow perch, (*Perca flavescens.*)
Yellow pike-perch, (*Stizostedium americanum.*)
Gray pike-perch or sauger, (*Stizostedium griseum.*)
Canada pike-perch, (*Stizostedium canadense.*)
White bass, (*Roccus chrysops.*)
Short-striped bass, (*Morone interrupta.*)
Lake pike, (*Esox lucius.*)
Pickerel, (*Esox reticulatus*, *E. fasciatus*, *E. cypho*, &c., &c.)
Masquallonge, (*Esox nobilior.*)
Brook trout, (of eastern slope,) (*Salmo fontinalis.*)
Brook trout, (of western slope,) (*Salmo iridea.*)

1. FOODS IN A FRESH CONDITION—Continued.

f. Fish, (fresh waters:)

Utah trout, (*Salmo virginalis.*)
Oquassa trout, (*Salmo oquassa.*)
Lake trout, (*Salmo confinis.*)
Salmon trout or Mackinaw trout, (*Salmo namaycush.*)
Siscowet, (*Salmo siscowet.*)
Sebago salmon, (*Salmo sebago.*)
Missouri trout, (*Salmo Lewisi.*)
White fish, (*Coregonus albus.*)
Otsego white fish, (*Coregonus otsego.*)
Lake herring, (*Argyrosomus harengus* and *A. clupeiformis.*)
Black fin of Lake Michigan, (*Argyrosomus nigripinnis.*)
Michigan grayling, (*Thymallus tricolor.*)
Mountain grayling, (*Thymallus montanus.*)
Suckers of eastern slope, (*Catostomus teres*, &c., *Ptychostomus aureolus*, &c.)
Suckers of western slope, (*Catostomus occidentalis*, &c.)
Fall fish, (*Semotilus rhotheus.*)
Chubs of eastern slope, (*Semotilus corporalis*, &c.)
Chubs of western slope, (*Lavinia exilicauda*, *Algansea*, sp., &c.)
"Pike" or "salmon trout" of California, (*Ptychocheilus grandis*, &c., *Pogonichthys inæquilobus*, &c.)
Dace, (*Ceratichthys biguttatus*, &c.)

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1. FOODS IN A FRESH CONDITION—Continued.

g. Fishes, (western coast:)

Rock trout, (*Chirus constellatus.*)

"Cod" of San Francisco, (*Ophiodon elongatus.*)

Black fish or "sheeps-head," (*Pimelometopon pulcher.*)

"Perch," (numerous species of *Embiotoca*, *Holconotus*, &c.)

"Bass," (*Atractoscion nobilis.*)

Coguard or little bass, (*Genyonemus lineatus.*)

San Francisco "smelt," (*Atherinopsis californiensis.*)

Pacific smelt, (*Osmerus elongatus.*)

Salmon, (*Salmo quinnat*, &c.)

Oulachan, (*Thaleichthys pacificus.*)

Sardine or pilchard, (*Pomolobus cœruleus.*)

Herring, (*Clupea mirabilis.*)

Sturgeon, (*Acipenser acutirostris*, &c.)

Columbia River sturgeon, (*Acipenser transmontanus.*)

h. Crustaceans.[1]

i. Mollusks.[1]

2. FOODS: DRIED AND SMOKED.

a. Mammal preparations:

Jerked bear-meat.

Jerked seal and walrus meat, (Indian.)

Jerked and smoked buffalo-meat.

Dried and smoked beef.

Dried and smoked venison.

Hams of various kinds.

Jerked porpoise-meat, (Indian.)

Jerked squirrels and other small mammals.

Pemmican.

Meat-biscuit, desiccated meat, meat extract, (*extractum carnis*,) desiccated milk, &c.

Sausages.

Cheese.

b, Bird preparations:

Jerked birds, (Indian.)

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[1] The various applications of these groups are enumerated in the "*List intended to give a general idea of the useful products (other than vertebrates) of the sea and shore, as well as of the interior waters of the United States,*" prepared by Mr. WM. H. DALL, and printed as Circular No. 2 of series (C,) National Museum series.

2. FOODS: DRIED AND SMOKED—Continued.

c. Reptile preparations:

Dried lizards, (Indian.)

d. Fish preparations:

Smoked halibut.

Dried cod, haddock, hake, &c.

Dried and smoked mullet and roes.

Dried and smoked garfish, flying-fish, &c.

Smoked herring, alewives, &c., and their roes.

Smoked salmon, oulachan, white-fish, smelt, &c., and thei roes.

Smoked sturgeon.

Veziga, prepared from the notochord of sturgeons.

e. Insects:

Dried grasshoppers, (Indian.)

f. Worms:

Dried worms, (Indian.)

g. Mollusk preparations:

Dried abalones, (*Haliotis*,) prepared by the California Chinese

Dried siphons of *Schizothærus* prepared by the Indians o the northwest coast.

Dried slugs, (*Limax*, &c.,) used by Indians.

h. Radiate preparations:

(Dried holothurians, "bêches de mer," used by Chinese.)

3. FOODS: SALTED, CANNED, AND PICKLED—Continued.

b. Bird preparations:

(Canned ortolans, (*Emberiza hortularia,*) esteemed a delicacy in Cyprus.)

c. Reptile preparations:

Salted and canned turtles and turtle soup.

Canned frogs.

d. Fish preparations:

Salted halibut, halibuts' fins, &c.

Salted cod, cods' tongues, sounds, and roe.

Salted mackerel.

Salted Spanish mackerel.

Salted bluefish.

Salted pompano.

Salted sword-fish.

Salted mullets.

Salted salmon.

Salted white-fish.

Salted trout.

Salted shad.

Salted herring.

Salted gaspereau.

Salted menhaden.

Salted anchovies.

(Spiced lampreys) used in Europe.

Anchovy-sauce and "essence of anchovies."

Canned menhaden, in oil, "American sardines."

Canned menhaden, in oil, "American club-fish."

Spiced menhaden, "ocean trout."

Canned herring, in oil, "Russian sardines."

Caviare, prepared from roe of the various sturgeons.

(Caviare, prepared from roe carps, used by Jews.)

("Boutargue" or "botargo" prepared on the Mediterranean from the roes of *Labrax* and *Mugil.*)

e. Crustacean preparations:

Canned lobsters.

Canned crabs.

Canned prawns and shrimps.

f. Mollusk preparations:

Canned oysters.

3. FOODS: SALTED, CANNED, AND PICKLED—Continued.

f. Mollusk preparations:

Canned clams.

Canned little-neck clams.

Canned scollops.

(Cockles, (*Cardium edule*,) used in Europe as pickles and catsup.)

4. GELATINES.

a Mammal gelatines, (see also under 24:)

Gelatines made from tanners refuse and from sinews.

Gelatines made from feet and hoofs.

Gelatines made from bone and ivory shavings.

b. Bird gelatines:

(Nests of esculent swallows, (*Calocalia esculenta*, *C. fuciphaga*, *C. indifica*, &c.,) exported from Indian Archipelago to China.)

c. Fish gelatines or isinglass, (see also under 24.)

d. Insect gelatine:

Gelatine from cocoons of silk-worms.

5. BAITS AND FOODS FOR ANIMALS.

a. Prepared baits, (see under B, 45.)

b. Food for domesticated animals:

Oil-factory scraps.

Fish-scraps.

[redacted]

6. FURS—Continued.

a. Mammal furs:

(American howling-monkey, (*Mycetes*, several species)—muffs.)

(Lion, (*Felis leo*,) of Africa and Asia—rugs.)

(Tiger, (*Felis tigris*)—rugs, &c.)

(Leopard, (*Felis pardus*)—rugs and saddle-cloths.)

Puma, (*Felis concolor*)—carriage-robes, rugs, &c.

Ocelot, (*Felis pardalis*)—rugs.

Jaguar, (*Felis onca*)—rugs.

Cat, (*Felis domestica*)—robes and philosophical apparatus.

Black cat.

White cat.

Maltese cat.

Tortoise-shell.

(Wild-cat, (*Felis catus*,) of Europe and Asia—robes and linings.)

(Snow leopard, (*Felis irbis*,) of Asia.)

Eyra, (*Felis eyra.*)

Yaguarundi, (*Felis yaguarundi.*)

(Cheetah, (*Cynailurus jubatus*,) of India and Southern Asia.)

Bay lynx, (*Lynx rufus*)—rugs, and, when dyed, muffs and boas.

Canada lynx, (*Lynx canadensis*)—rugs and trimmings, and dyed muffs, boas, &c.

Dog, (*Canis familiaris.*)

Eskimo dog.

Wolf, (*Canis lupus*)—linings, rugs, and robes.

White wolf.

Black wolf.

Gray wolf.

"Blue wolf."

Red wolf.

Coyote, or prairie wolf, (*Canis latrans*)—rugs and robes.

(Jackal, (*Canis aureus*,) of Old World.)

Red fox, (*Vulpes alopex*, var. *fulvus*)—robes, (mostly imported to Turkey.)

Cross fox, (*Vulpes alopex*, var. *decussatus*)—robes, trimmings.

Black and silver fox, (*Vulpes alopex*, var. *argentatus*)—muffs, cloaks, trimmings; also, fox-skins dyed to imitate lynx; also, various imitations of silver-fox, made from skins of more common varieties.

6. FURS—Continued.

a. Mammal furs:

Arctic fox, (*Vulpes lagopus.*)

White fox.

Blue fox.

Kit fox, (*Vulpes velox*)—robes, muffs, trimmings.

(Cossac fox, (*Vulpes corsac,*) of Asia.)

(Mountain fox, (*Vulpes montanus,*) of India.)

Gray fox, (*Urocyon virginianus*)—rugs, robes, and linings.

(Spotted hyena, (*Hyæna crocuta,*) of West and South Africa.)

(Striped hyena, (*Hyæna striata,*) of West Africa and India.)

Fisher or pekan, (*Mustela Pennanti*)—linings, tails used for trimmings.

American or Hudson's Bay sable, (*Mustela americana*)—cloaks, muffs, cuffs, boas, linings, &c.:

Silver variety.

Orange variety.

Brown or common variety.

(Russian sable, (*Mustela zibellina,*) of North Europe and Asia—cloaks, muffs, boas, linings, &c.)

(Tartar sable, or kolinsky, (*Mustela sibirica*)—cloaks, muffs, and dyed to imitate Russian sable.)

(Pine marten, (*Mustela abietum,*) of North Europe and Asia.)

(Stone marten, or French sable, (*Mustela saxorum,*) of Eu-

[redacted]

6. FURS—Continued.

a. Mammal furs:

(European badger, (*Meles vulgaris*)—muffs and rugs.)

Skunk, Alaska sable, (*Mephitis mephitica*)—muffs, boas, &c.

White-backed skunk. (*Conepatus mapurito.*)

Striped skunk, (*Spilogale putorius.*)

Otter, (*Lutra canadensis,*) with specimens of the plucked and dyed fur—muffs, trimmings, &c.

Sea otter, (*Enhydra marina*)—muffs, gloves, collars, cuffs, trimmings.

Black bear, (*Ursus americanus*)—caps, rugs, muffs, robes, &c.

a'. Cinnamon variety.

b. Silvery variety.

(Brown bear, (*Ursus arctos,*) of Europe and Asia.)

Grizzly bear, (*Ursus horribilis*)—rugs, robes, trimmings.

White bear, (*Thalarctos maritimus*)—rugs, robes, and used extensively by the Eskimos.

Raccoon, (*Procyon lotor*)—hats, linings.

Fur-seal, (*Callorhinus ursinus*)—cloaks, hats, gloves, muffs, linings, trimmings, &c.

Cub fur.

(Antarctic fur-seal, (*Arctocephalus aucklandicus*, &c.)

Hair seal. (*Phoca vitulina* and *Phoca Richardsii*)—coats, caps, linings for shoes.

Harp seal, (*Pagophilus grœnlandicus,*) with specimens of the white fur of the unborn cub, and the blue fur of the young.

Hood seal, or bladder-nose, (*Cystophora cristata.*)

Square flipper, or bearded seal, (*Erignathus barbatus,*) with specimens of fur dyed to imitate leopard.

Banded seal, (*Histriophoca equestris*)—used by Eskimos as fur.

Gray seal, (*Pusa gryphus.*)

Ringed seal, (*Pagomys fœtidus.*)

Bison, or buffalo, (*Bison americanus*)—rugs and robes.

a'. Mountain bison.

b. Common bison.

Musk-ox, (*Ovibos moschatus*)—robes, rugs, and trimmings.

(Yak, (*Poëphagus grunniens,*) of Asia—robes and trimmings.)

Mountain goat, (*Aplocerus montanus*)—robes, &c.

6. FURS—Continued.

a. Mammal furs:

(Llama, guanaco, paco, and vicugna, (*Auchenia*, sp.)—trimmings, &c.)

Goat, (*Capra*, sp.)—rugs, trimmings.

a'. Angora goat.

b. Cashmere goat.

c. Other varieties.

Sheep, (*Ovis aries*)—rugs, trimmings, &c.

a. Astrakhan sheep.

b. Caracoul sheep.

c. Other varieties. Lamb-skins and dyed furs.

Antelope, (*Antilocapra americana*)—rugs.

Moose, (*Alces malchis*)—rugs and robes.

Elk, (*Cervus canadensis*)—rugs and robes.

Reindeer, (*Tarandus rangifer*)—robes, coats, gloves, &c.

Caribou, (*Tarandus rangifer* var.)—robes, coats, gloves.

Mule deer, (*Cariacus macrotis*)—trimmings, robes.

Virginia deer (*Cariacus virginianus*)—trimmings, robes.

Mole, (*Scalops* and *Condylura*, sp.)—robes, garments.

(European mole, (*Talpa europæa*)—robes, garments.)

Woodchuck, or siffleur, (*Arctomys monax*)—robes, exported to Europe as "white and gray weenusk."

Marmot, (*Arctomys caligatus*)—robes, trimmings.

[redacted]

6. FURS—Continued.

a. Mammal furs:

(Beaver, (*Castor fiber*,) of Northern Europe and Asia.)

Beaver, (*Castor canadensis*)—linings and muffs.

White beaver.

Spotted beaver.

Rats and mice, (*Mus.*, sp. var.)

Lemming, (*Myodes torquatus* and *obensis*)—robes.

Rabbit, or cony, (*Lepus cuniculus*)—children's furs, and imitations of seal, beaver, &c., exported largely to China.

White variety.

Blue variety.

Brown variety.

American native rabbit furs, such as *Lepus glacialis*, used for muffs, boas, and feltings.

Possum, (*Didelphys virginiana.*)

(Kangaroo, (*Macropus giganteus*,) of Australia.)

(Ornithorhynchus, (*Ornithorhynchus anatinus*,) of Australia.)

b. Skins of birds used as furs:

Turkey furs, (*Melagris gallopavo*, &c.)

Gull furs, (*Larus argentatus*, &c.)

Grebe furs, (*Podiceps aristatus*, &c.)

Loon furs, (*Colymbus torquatus*, &c.)

Swan furs and swan's down trimmings, (*Cygnus americanus*, &c.)

Pelican furs, (*Pelecanus fuscus*, &c.)

Adjutant crane, (*Ciconia argala*)—feathers used as fur.

Puffin furs, (*Fratercula arctica*, &c.)

Penguin furs, (*Aptenodytes*, *Pennantii*, &c.)

Feathers of common fowl used in trimmings.

7. LEATHERS. (See under 20.)

8. TEXTILE FABRICS.

a. Prepared from hair of mammals:

Human hair used in manufacture of watch-chains.

Hair of bats used in felting and in plaiting ropes in Central America and tassels in New Caledonia.

Hair of raccoon used in felting, (largely exported to Germany for the use of hatters.)

Hair of weasels and sables used in felting.

XTILE FABRICS—Continued.

a. Preparations of hair of mammals:

Hair of fur seal woven with silk in the manufacture of shawls.

Moose hair and its fabrics.

Ox and calf hair used in the manufacture of imitation woolen goods.

Sheep's wool, with specimens of fleeces and stapled wools, from various breeds and localities, short-wool fabrics, broadcloths, merinoes, flannels, mouselins de laine, serges, tweeds, blankets, carpets, and tartans, worsted fabrics, stuffs, bombazines, camlets, shawls, plushes and velvets, hosiery, and yarns, felts, felt-cloths, and felt-hats.

Goats' wool with specimens of mohairs, cashmeres, plushes, velveteens, camlets, and shawls. (For manufactured wigs and perukes, see under 21.)

(Yak (*Poëphagus grunniens*) wool with specimens of yak-lace and other fabrics.)

(Camels' hair with specimens of fabrics, plushes, felts, shawls, &c.)

(Hair of llama, paco, guanaco, and vicugna, with specimens of alpaca, guanaco, and other fabrics, and umbrellas and other articles manufactured.)

Hair of horses used in weaving furniture-covers, crinoline-skirts, and bags for pressing oil.

Hair of buffalo used in plaiting ropes, lariats, &c.

Fur of mole used in felting.

[illegible] (castor) fur with specimens of the felt cloths, hats, &c.

[illegible] and in the manufacture of hats.)

8. TEXTILE FABRICS—Continued.

c. Prepared from silk of insects:

Silk of common silk-worm, (*Bombyx mori.*)

Silk of *Samia cecropia*, *Samia polyphemus*, and other native American moths.

(Silk of exotic moths other than *Bombyx mori*, such as the tussah, (*Bombyx pernyi* and *Bombyx mylitta*,) the moonga, (*Saturnia assamensis*,) the joree, (*Bombyx religiosa*,) the ena or arindy, (*Bombyx cynthia.*))

Fabrics woven by the insects themselves, as *Tinea padilla.*

Silk of spiders.

d. Prepared from byssus of mollusks.

(Fabrics woven from byssus of the wing-shell (*Pinna nobilis*) and other mollusks.)

III. MATERIALS EMPLOYED IN THE ARTS AND MANUFACTURES.

* *Hard materials.*

9. IVORY AND BONE. (This collection should include specimens of the various ivories and bones in their rough state, and manufactured into buttons, trinkets, cutlery-handles, canes, pen and pencil handles, brush-handles, billiard and bagatelle balls, dice, piano-keys, harness-rings, combs, false-teeth, philosophical instruments, and as used by portrait painters and photographers.)

a. Ivory of mammals:

Tusks of walrus used for trinkets, handles, jewelry, buttons, paper-knives, counters, &c.

Teeth of bears, dogs, wolves, foxes, peccaries, and other large mammals, used as implements, arrow-tips, and ornaments, by Indians.

Elk-ivory used by Indians in ornamentation.

Tusks of mammoth elephant (*Elephas primigenius*) from northern America and Asia, with Eskimo carvings and of "Siberian ivory."

9. IVORY AND BONE—Continued.

a. Ivory of mammals:

(Tusks of African elephant with specimens of sawed and scroll ivory and of the manufactured balls, combs, piano-keys, handles, rings, canes, buttons, trinkets, bangles, and miniature tablets.)

(Tusks of the Asiatic elephant and their applications.)

(Teeth of hippopotamus as used for handles for surgical instruments, index-fingers, and formerly for false-teeth, (trade-name, "sea-horse.")

Teeth of wild-hog used in manufacture of jewelry, vinaigrettes, &c.

Teeth of peccary.

Ivory of narwhal used for canes.

Teeth of sperm-whale and their application to the manufacture of balls, buttons, and trinkets.

Incisors of beaver used by Indians for chisels, knives, and ornaments.

b. Ivory of reptiles:

Teeth of alligator used for jewelry, whistles, cane-handles, buttons, &c.

c. Ivory of fishes:

Sharks' teeth used in arming weapons.

Teeth of sharks and other fish used as trinkets.

Jaws of the sleeper-shark (*Somniosus brevipinna*) used for

9. IVORY AND BONE—Continued.

f. Bone of fishes:

Fish-bones, used by Indians and Eskimo in making implements.

Shark's vertebræ, used for canes.

Bones of sharks and skates, used (in Japan) in making imitation tortoise-shell.

g. Waste bone and ivory:

Use in manufacture of bone-black, ivory-black, and bank-note ink, (see under 29.)

Use in manufacture of sizes and glues, (see under 24.)

Use in manufacture or gelatine for food, (see under 4.)

Use in manufacture of phosphorus, carbonate of ammonia, (hartshorn,) and sal ammoniac, (see under 30.)

Use in manufacture of bone-charcoal for filters, (see under 30.)

Use in manufacture of paper.

Use of shavings in case-hardening gun-barrels and other fine steel.

10. HORN. (Embracing the varieties of horn known to commerce, the split and pressed horns, and the various manufactured articles, such as jewelry, combs, and handles.

a. Horn, employed as a material:

Horn of rhinoceros, used for handles and trinkets, cups, boxes, whips, and canes.

Horns of ox, sheep, and goat, used for handles, buttons, combs, powder-flasks, cups, boxes, stirrups, spoons, and imitations of tortoise-shell, also "sensitive Chinese leaves," and formerly for transparent plates in lanterns and horn-hooks, for trumpets, and for finger-nails in lay figures.

Horn of buffalo, used like that of ox.

(Horn of Asiatic buffalo, (*Bos bubalus.*))

Horn of mountain-sheep and mountain-goat, used by Aleutians, in making spoons, bowls, and numerous other implements.

b. Antlers:

Antlers of deer, elk, and moose, (stag-horn,) used in the manufacture of handles for instruments, trinkets, and buttons.

10. HORN—Continued.

b. Antlers:

Antlers of deer, elk, moose, and nearly all species of ruminants, employed for ornamental purposes.

c. Chemical and other applications:

Burnt horn, (*cornu ustum*,) used in dentifrices.

Carbonate of ammonia, (hartshorn,) manufactured from deer-horns, (see under 30.)

11. HOOFS AND CLAWS, &c. (Embracing the commercial hoof, and the various stages of manufacture represented by specimens.)

a. Hoofs:

Hoofs of ox and bison, used in making buttons, combs, and handles.

Hoofs of horse, used like those of ox and bison.

Hoofs of musk-ox, deer, and antelope, used by Indians in ornamentation.

Feet of deer, used for knife-handles, stool-feet, &c.

b. Claws:

Claws of bear, puma, wolf, &c., used by Indians in ornamentation.

(Claws of lion and tiger, used by jewelers for trinkets.)

Human nails, used by Indians for ornamental trimmings.

c. Chemical applications of hoofs and claws:

[redacted]

3. TORTOISE-SHELL—Continued.

a. Shell of tortoise (*Eretmochelys imbricata, E. squamata*) used in manufacture of combs, handles, jewelry, inlaying, and buttons, together with imitations of tortoise-shell in horn, shark's bone, and celluloid.

b. Shells of land tortoises, used by Indians for pots, scoops, and rattles.

4. SCALES.

a. Shell of mammals:

Shell of armadillo, used by Texans and Mexicans.

b. Scales of fishes used in ornamental work, with specimens of flowers and other articles manufactured:

Scales of parrot fishes, (*Scaridæ* and *Labridæ.*)

Scales of mullets, (*Mugilidæ.*)

Scales of sheepshead, &c., (*Sparidæ.*)

Scales of drum and bass, (*Sciaenidæ.*)

Scales of Serranidæ and perches, (*Percidae* and *Labracidæ.*)

Scales of Lobotidæ.

Scales of tarpum, (*Elopidæ.*)

Scales of herrings, (*Clupeidæ.*)

Scales of Cyprinidæ.

Scales of eels, used in the north of Europe to give a pearly luster in ornamental house-painting.

Scales of gar-pikes, used by Indians for arrow-tips.

(Pearl white, or *essence d'Orient*, prepared from scales of *Alburnus lucidus* and other Cyprinidæ and Clupeidæ, used in making artificial pearls.) (See under 27.)

Shagreen of trigger-fish, (*Balistes,*) used in polishing wood.

Shagreen of sharks, used as leather, (see under II, B. 5,) and for polishing purposes, particularly in the manufacture of quill pens.

Scales of sturgeons, used by Indians for implements.

For gelatine as a material and the arts and papier glacé, see 24.

15. PEARL.

a. Pearls and nacre, (embracing the pearl-yielding shells, with the pearls and the mother-o'-pearl in the rough state, with the manufactured buttons, handles, and jewelry, pearl-powder, inlaid work, and papier maché, ornamented with mother-o'-pearl:)

15. PEARL—Continued.

a. Pearls and nacre:

Top-shells, (*Turbinidæ*,) and their application to manufacture of shell-flowers.

Tower-shells, (*Trochidæ*.)

Ear-shells, (*Haliotidæ*,) used in manufacture of buttons, handles, inlaid work, and pearl-powder.

Other gastropods supplying nacre.

Pearl-oysters, (*Aviculidæ*,) with pearls and nacre.

River-mussels, (*Unionidæ*,) with pearls and nacre.

Mussels, oysters, and other conchifers supplying pearls and nacre.

Shells of nautilus and argonaut, prepared to exhibit their nacre.

Ornamental pearl-work, imitating sprays of flowers, &c.

Imitation pearls.

16. SHELL.

a. Cameo shell:

Shell of conch, (*Strombus gigas*,) and carvings.

Shell of helmet, (*Cassis rufa*, *C. tuberosa*, and *C. madagascariensis*,) with carvings.

b. Shells used for implements, &c.:

Shells of *Strombus*, *Triton*, *Dolium*, *Fusus*, *Murex*, and *Buccinum*, used for fog-horns, lamps, vases, and ornamental

16. SHELL—Continued.

b. Shells used for implements, &c.:

(Painters' mussel, (*Unio pictorum*,) used to hold colors.)

(Shells of *Placuna placenta*, used in China as a substitute for window-glass.)

Shells of *Mercenaria violacea*, *Purpura lapillus*, and *Buccinum undatum*, used by Indians of eastern coast in manufacture of money, with specimens of wampum, (with the modern wampum or shell-beads manufactured for the Indian trade,) and of the hyqua or *Dentalium* shells, employed in a similar manner by the Indians of the Pacific coast.

Specimens of the cowry, (*Cypraea moneta*,) "Live cowry" and dead cowry, used in African trade and for trimmings.

Shells of *Cypraea*, *Rotella*, *Oliva*, *Turritella*, *Phasianella*, (Venetian shells,) &c., mounted as buttons and jewelry.

Composition shell-work for box-covers and frames, made by glueing shells in mosaics.

Calcined shells, used by dentifrice and porcelain makers. (See, also, under 32.)

Cuttle-fish bone from *Sepia officinalis*, used as a pounce, as a dentifrice, as polishing-powders, for taking fine impressions in counterfeiting, and as food for birds. (See, also, under D. 5.)

Concretions from the stomach of *Astacus*, known as "crab's-eyes" and "crab-stones," and used as antacids.

Shell of king-crab, (*Limulus polyphemus*,) used as a boat-bailer.

Opercula of mollusks, used as "eye-stones."

17. CORAL.

a. Coral as a material:

Red coral, (*Corallium nobilis*,) with specimens of the five commercial grades (1, froth of blood; 2, flower of blood; 3, 4, 5, blood of first, second, and third qualities) of the white variety, and of the round beads, negligée beads, bracelets, pins, coronets, armlets, and earrings, &c.

White coral, *Oculina*, sp., used by jewelers.

Madrepores and other showy corals, used for ornamental purposes.

Horny axis of black flexible coral, (*Plexaura crassa*,) used for canes and whips in the Bermudas.

17. CORAL—Continued.

a. Coral as a material:

Axis of fan coral, (*Rhipidogorgia*,) used for skimmers and strainers in the Bermudas.

Coral, used for building purposes.

Coral rock of recent formation, (Coquina,) used in Florida in manufacture of ornamental vases and carvings.

Calcined coral, used for dentifrices, as an antacid, &c.

Imitations of red coral in celluloid, rubber, and other substances.

18. INFUSORIAL EARTHS.

a. Polishing powders, (used for polishing metals, cabinet-ware, and stone:)

Specimens of polishing-slate, tripoli, and other foreign polishing-powder.

Specimens of American infusorial deposits.

b. Infusorial earths, employed in manufactures:

Infusorial earth, used in making window and plate glass.

Infusorial earth, used in making soluble glass.

Infusorial earth, used in making mortar.

Infusorial earth, used in making molds for metal casting.

Infusorial earth, used in making filters.

Infusorial earth, used in making dynamite.

Infusorial earth, used in making fire-proof packing.

20. LEATHERS—Continued.

a. Prepared from mammal skins:

Bear-leather.

Raccoon-leather, used for gloves and upper-leathers of shoes.

Seal-leather, used for fine shoes and in the manufacture of "patent leather," and by Eskimos for numerous purposes.

Sea-lion leather, used by Eskimos to cover bidarkas and for garments and beds.

Walrus-leather, used by Eskimos for harness, tables, thongs, seal-nets and for covering polishing wheels.

Bison-leather (and buffalo-leather, buff-leather.)

Ox-leather, with specimens of sole-leather, split-leather, grain-leather, rawhide thongs, whips, leather-belts and saddles, and of calf-skins, prepared for binders' and boot-makers' use, as Russia leather and vellum, and tawed, as parchment.

Sheep-leather, with specimens of binder's leather, imitation chamois leather, wash-leather, buff-leather, roan, imitation morocco and parchment, with vellum made from skins of dead-born lambs, and manufactured gloves, &c.

Goat-leather, with specimens of shagreen-leather, morocco-leather, as used for linings, upholstery, bindings, and pocket-books, parchment, drum-heads, &c., with kid-leather, used in manufacture of shoes and gloves, under-clothing, and vellum made from skin of young kids, also skin-bottles used in Asia.

Horse and ass leather, used in manufacture of shagreen, sole-leather, harness-leather, saddles, trunks, water-hose, pump-valves, military accoutrements, ladies' shoe-uppers.

(Chamois leather, (*Capella rupicapra*,) used for polishing purposes and for straining mercury.)

(Leather of gazelle, (*Gazella dorcas*,) used in packing commercial aloes, and of African antelopes, used in packing elephants' tusks.)

Deer-leather, dressed as buff-leather, chamois-imitation leather, Indian dressed (buckskin,) and for the finer moroccos, also manufactured into gloves, gaiters, undergarments, polishers, &c.

Moose-leather in ordinary and buckskin finish.

20. LEATHERS—Continued.

a. Prepared from mammal skins:

Caribou-leather in ordinary and buckskin finish.

(Reindeer-leather.)

Elk-leather in ordinary and buckskin finish.

Antelope-leather in plain, buckskin, and oil-finish, used in manufacture of castor-gloves.

Peccary-leather as used in the manufacture of gloves.

Hog-leather used by saddlers, shoemakers, and book-binders.

Hippopotamus-leather used for buffing or polishing wheels.

Rhinoceros-hide used for shields, targets, whips, &c.

Beluga-leather dressed as kid, sole, harness, velvet, plush, boot, mail-bags, belts, and patent (varnished) leather.

Porpoise-leather.

Beaver-leather used in manufacture of saddles, shoes, gloves, and trunks.

(Nutria-leather (*Myopotamus coypus*) of South America.)

Rat-leather used for thumbs of kid gloves.

(Kangaroo-leather.)

Leather trimmings used as stuffing for balls, &c.

b. Prepared from intestines of mammals:

Parchment from viscera of seals, used by Eskimo for clothing, bags, and blankets.

Leather from pharynx of seal and walrus used by Eskimo for boot-soles.

Parchment from viscera of bears used in Kamtchatka for masks and window-panes.

Viscera of ox used in manufacture of gold-beaters' skin.

Bladders of animals used for pouches, parchment, bottle and jar covers, and by Eskimo for oil-bottles.

Viscera of sheep used in manufacture of "cat-gut," with specimens of whip-cord, hatters' cord, for bowstrings, clock-makers' cord, filandre, guitar, violin, and harp strings, angling-lines, &c.

Viscera of hog used as envelopes for minced meat, sausages, &c.

Sinews of sheep, dear, goat, buffalo, seal, walrus, and other animals used in manufactures of threads, lines, nets, and snow-shoes, in strengthening bows, &c., the Babiche of the Eskimos of the northwest coast.

). LEATHERS—Continued.

c. Prepared from bird-skins: (Eskimos.)

Eider-leather.

Auk-leather.

(Ostrich-leather used by Arabians.)

d. Prepared from reptile skins:

Alligator-leather.

Rattlesnake-leather.

Other snake-leather.

e. Prepared from fish-skins:

Leather prepared from scaled fish by Indians.

Eel-leather, (pigtails, queues, flail-thongs.)

Shark-leather, (shagreen used for coverings and by the Alaska Indians for boot-soles.)

Sturgeon-leather.

(Skins of *Diodon* used in making helmets.)

Stomach membranes of halibut used in Greenland for window-transparencies.

f. Leather waste:

Paper manufactured from waste.

Glue manufactured from waste, (see under 24.)

Prussian blue made from leather waste, (see under 30.)

1. HAIR AND WOOL.

a. Hair used in weaving and felting, (see under 8.)

b. Hair used for wigs and ornament:

Human hair as an article of commerce, with specimens of switches and wigs, and also of the trade imitations of hair in jute, horse-hair, &c.

Goats' wool as employed in manufacture of wigs and perukes.

Horse-hair employed for military accoutrements and for standards, (Turkey.)

Human scalp-locks as Indian trophies.

Scalps of animals as trophies.

c. Hair and bristles used for brushes, (embracing the commercial hair and bristles, assorted and unassorted, and specimens of the manufactured articles:)

Hair of skunk used for fine brushes.

Hair of bear used for varnishing-brushes.

21. HAIR AND WOOL—Continued.

c. Hair and bristles used for brushes:

Hair of American badger used for fine shaving, graining, gilding, and dust brushes.

(Hair of European badger used for coarse brushes.)

Hair of dog used for coarse pencil-brushes.

Hair of squirrel, marten, sable, kolinsky, and weasel, especially the tails, used in making fine artists' pencils.

(Hair of camel used for pencils.)

Bristles of hog and peccary used in making coarse brushes for varnishing, scrubbing, &c.

Tails of horses, buffaloes, &c., used for fly-brushes.

(Tails of yak used for fly-brushes.)

(Tails of elephants used for brushes and standards.)

Sheep's wool (on skin) used for black-board rubbers.

Hair of deer and antelope (on skin) used by Indians for hair-brushes.

Ox-hair from the inside of cows' ears used for striping and lettering brushes.

d. Hair used in other manufactures:

Bristles used in shoemakers' waxed ends.

Bristles used in anatomical instruments.

Hair and bristles used in artificial flies. (See under B, 45.)

Hair of cattle used in strengthening mortar and plaster.

[redacted]

22. QUILLS—Continued.

a. Quills of mammals:

(Quills of porcupine used for pen-holders, floats for fishing, eyelet-punches, &c.)

(Quills of European hedge-hog, on skin, used as a muzzle for weaning calves.)

b. Quills of birds:

Quills of swan and turkey for engrossing-pens.

Quills of goose and eagle for writing-pens.

Quills of crow and duck for fine pens.

Quills used in making toothpicks, fishing-floats, color-bottles, pencil-handles, needle-holders, &c.

23. FEATHERS.

a. Feathers used for clothing. (See under Furs, D 6.)

b. Feathers used for implements, (including manufactured articles:)

Feathers of hawks used as fans and screens.

Feathers of fowl, turkey, grouse, and peacock used for brushes, fans, and screens.

Feathers of ibis, spoonbill, egret, and bittern used for fans and screens.

Feathers of flamingoes, swans, geese, and ducks used for fans and screens.

c. Feathers used for plumes and ornament, (including plumes, head-dresses, cockades, hat and dress trimming, &c.:)

Feathers and wings of small perchers used in millinery and in manufacture of feather flowers.

Feathers of trogons and birds of paradise used as plumes and for feather flowers.

Feathers of humming-birds, scalps, and throats used in ornamental work.

Feathers of kingfishers used in plumagery.

(Feathers of parrots used in making feather flowers.)

Eagle and hawk feathers used for plumes.

Feathers of pigeons used for ornamental work.

Feathers and wings of cock used as plumes, trimmings, &c., natural and dyed.

Breast feathers of grouse, pheasants, and turkeys used as roll-plumes in hats.

23. FEATHERS—Continued.

c. Feathers used for plumes, &c.:

Feathers of ibises, spoonbills, flamingoes, herons, egrets, and bitterns used for plumes and ornamental work.

(Feathers of adjutant, (*Lepoptilus argala*,) and marabou, (*Lepoptilus marabou*,) used for plumes and trimmings.)

Feathers of flamingoes, swans, geese, and ducks used in ornamental work for roll-plumes, and swans' down for trimmings. (See under 6.)

Breast-feathers of gulls, terns, and tropic birds used as roll-plumes.

(Feathers of African ostrich used for plumes and trimmings, with specimens of undressed, scoured, bleached, scraped, and dyed grades.)

Feathers of American ostrich.

Specimens of composite feather flowers.

Specimens of plumagery work on metal.

Specimens of birds mounted for use in millinery.

d. Feathers used in other manufactures:

Feathered arrow-shafts. (See under B, 18.)

Feathers used in making artificial flies. (See under B, 45.)

Feathers used in manufacture of textile fabrics. (See under D, II, C.)

e. Down of birds:

[redacted]

24. GELATINE AND ISINGLASS—Continued.

a. Gelatine:

Bone-glue, (Osteocolla.)

(Glue made in India from skin of the ass, (Hippocolla.))

b. Isinglass:

Isinglass, (Ichthyocolla,) made from air-bladders and skins of fishes and used in the manufacture of fine glues and sizes, adhesive and court plasters, diamond cement, imitation glass, and table-jelly and confectionery, (see under D. 1, D,) in refining wines and liquors, in adulterating milk, in fixing the luster of artificial pearls, and in lustering silk ribbons, (embracing the dried bladders and the manufactured products,) in their grades of "lyre," "heart-shaped," "leaf," and "book" isinglass.

Isinglass from sounds of cod and hake.

Isinglass from the squeteague family, (*Sciænidae,*) principally used by confectioners.

Isinglass from cat-fish family, (*Siluridae.*)

Isinglass from carp family, (*Cyprinidae.*)

Isinglass from sturgeons in all its grades and commercial forms.

Isinglass prepared from fish-skins.

25. FLEXIBLE MATERIALS DERIVED FROM INVERTEBRATES.

a. Insect productions:

Silk-worm "gut" used in making leaders for fish-lines.

(Nest of Cayenne-ant, (*Formica bispinosa,*) used as a mechanical styptic.)

Spiders' web used as a mechanical styptic and for the cross-lines in optical instruments, (see, also, under D, 8.)

Papier-maché of hornets' nests used for gun-wadding.

b. Mollusk productions:

Byssus of mollusks, (see under D, 8.)

26. SPONGES.

a. Specimens of American commercial sponges, with the different grades, and bleached sponges:

(Specimens of Mediterranean sponges.)

Surgical apparatus, probangs, aurilaves, "sponge-tents," and other instruments manufactured.

Spongeo-piline used as a substitute for poultices.

Sponges used in stuffing mattresses and cushions.

27. OILS AND FATS.

a. Mammal oils:

Bear-oil and bear-fat used as a cosmetic and in the manufacture of pomatums.

Dog-oil used in the manufacture of kid-gloves.

Seal-oil, in its various grades, used for lubricating.

Sea-elephant oil.

Sea-lion oil.

Manatee-oil.

Dugong-oil.

Oil and fat from domestic animals, tallow, suet, lard, lard-oil used in lamps, for lubricating, and neats-foot oil used in dressing leather, also manufactured into various substances, (see D, 30,) and tallow candles and night-lights.

Oil from body of whales, grampuses, and porpoises used in the arts, for lubricating, painting, &c.

Black-fish and porpoise-jaw oil used in lubricating fine machinery, watches, clocks, and guns, with specimens of blubber.

Grampus-oil used for lubricating fine machinery.

Sperm-oil used in lamps, for lubricating, as an emollient in medicine, for lip-salves, and in the manufacture of spermaceti.

Manufactured glycerines, used as a preservative and antiseptic, as a cosmetic, as an emollient, as a substitute for cod-liver oil, in the manufacture of perfumes and hair-

27. OILS AND FATS—Continued.

b. Bird-oils:

Goose-oil used by watch-makers, and as an emollient.

(Oil of guacharo, (*Steatornis caripensis*,) used in South America as food.)

(Ostrich used for food, and by the Arabs in medicine, and emu-oil used in Australia in medicine.)

(Oil of penguin, (*Diomedea chilensis*,) of Falkland Islands, sold in London for currying leather.)

(Peacock's fat and oil.)

(Oil of mutton-bird, (*Procellaria obscura*,) of Bass's Straits, used for lamp-oil illuminating.)

(Oil of frigate-bird, (*Tachypetes aquila*,) sometimes used in medicine.)

Oil of pigeon, (*Ectopistes migratorius*,) used as food by Indians and frontiersmen.

(Fulmar-oil from island of Saint Kilda.)

c. Reptile oils:

Alligator-oil manufactured in Florida.

(Alligator-oil used by South American Indians, mixed with chica pigment for painting their bodies.)

Turtle-oil made from turtle-eggs, used in dressing leather and in manufacture of soap.

Rattlesnake and other snake oils.

d. Fish-oils:

Sun-fish oil used by fishermen for cure of rheumatism.

Cod-oil, also cod-liver oil used in medicine, as a food and emollient, and in lubricating.

Hake and haddock liver oil used in adulterating cod-liver oil.

(Pollock-oil used by Shetlanders for illumination.)

Menhaden-oil used in currying leather, in rope making, for lubricating, for adulterating linseed-oil, as a paint-oil, and exported to Europe for use in the manufacture of soap and for smearing sheep.

Herring-oil.[1]

White-fish oil.[1]

Sturgeon-oil.[1]

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[1]—These oils, with other oils made from fishes, and a large part of the seal [illegible] are known indiscriminately as fish-oil and used chiefly for the [illegible] the head of menhaden-oil.)

27. OILS AND FATS—Continued.

d. Fish-oils:

Oulachan oil used by Indians of Northwest coast for food and illumination.

Shark and skate liver oil, including the "Rouen oil," made on the coast of Normandy from the livers of *Raia aquila*, *R. pastinaca*, and *R. batis*, used like cod-liver oil.

Cramp-fish oil used by fishermen for cure of rheumatism.

Soaps made from fish-oil.

28. PERFUMES.

a. Mammal perfumes:

(Civet of the civet-cat (*Viverra civetta*) of Africa.)

(Civet of the rasse (*Viverra rasse*) of Java.)

(Zibeth civet of the Zibeth (*Viverra zibetha*) of Indian Archipelago.)

(Musk from musk-deer, (*Tragulus*, sp. var.,) in its various grades, of Tonquin or Thibet, and Kabardin, Russian, or Siberian musk.)

Musk of musk-ox.

Musk of the musquash.

Castoreum of the beaver, including the various commercial grades, the Canadian, Hudson's Bay, and Russian castoreum, and specimens of castorine.

(Hyraceum of the daman, (*Hyrax capensis.*))

29. COLORING MATERIALS—Continued.

b. Derived from birds:

Shell of eggs, used for white pigment.

Series of murexides, or purpurate of ammonia dyes, made from guano.

c. Derived from fishes:

(*Essence d'Orient*, or fish-scale pearl, used as a pigment.)

(Gall of carp, used in Turkey as a green paint and in staining paper.)

d. Derived from insects:

(Cochineal dye, from *Coccus cacti* of Mexico, used in manufacture of rouge, of carmine, and lake pigments, and in coloring tinctures.)

Canadian cochineal.

(Kermes and other cochineals of commerce, *Coccus ilicis.*)

(Lac dye and lac lake, from *Coccus lacca*, *C. polonicus*, *C. uva ursi*, and *Ophis fabæ.*)

Dye prepared from bed-bug, (*Cimex lectularius.*)

(Dye prepared from *Trombidium*, in Guinea and Surinam.)

Nut-galls produced by insects, and used in tanning, for black dyes, for woolen cloth, silk, and calico, and in manufacture of ink and gallic and pyrogallic acid, employed in photography.

e. Derived from mollusks:

(*Sepia* from *Sepia officinalis.*)

Purple dyes from gastropods, *Murex*, *Purpura*, &c.

Purple dyes from nudibranch mollusks.

30. CHEMICAL PRODUCTS AND AGENTS EMPLOYED IN ARTS AND MEDICINE.

a. Derived from mammals:

Secretion of skunk.

Album græcum of dogs, used as a depilatory in tanning hides.

Albumen of blood, employed in sugar-refineries, in certain cements and pigments, and as antidote and emollient.

Dung, used in calico-printing.

Gall of animals, used in mixing colors, in fixing the lines of crayon and pencil drawings, in preparing the surface of ivory for painting, in removing grease, and in medicine.

Pepsine and pancreatine, prepared from stomachs of hogs and calves.

30. CHEMICAL PRODUCTS, &c.—Continued.

a. Derived from mammals:

(Koumiss, a fermented liquor, prepared from mare's and cow's milk, and employed in medicine.)

Phosphorus, prepared from bones, with specimens of matches, vermin poisons, and other products.

Vaccine lymph, derived from cows.

Ammonia, prepared from bones and horn.

Sal ammoniac, prepared from bones and dung.

Prussiates, prepared from hoof, horn, and leather waste, dried blood, hair, and wool, with specimens of blue cyanide of potassium.

Lime from bones and bone phosphates. See also under 32.

Punk and tinder, made from droppings of camel and bison.

Animal charcoal, used as a decolorizer.

b. Derived from birds:

Albumen of eggs, used in photography, in clarifying liquors, by physicians as emollients and antidotes, and by apothecaries in suspending oils and other liquids in water.

Egg-shells, employed as an antacid.

c. Derived from reptiles:

Crotalin of rattlesnake and copperhead.

(*Scincus officinalis* of Egypt, used by European practitioners as sudorific and stimulant.)

[redacted]

30. CHEMICAL PRODUCTS, &c.—Continued.

e. Derived from insects:

Coccinella, used as a remedy for toothache.

(Trehala, made from nests of beetles, (*Larinas nidificans*,) of East Indies, and used as a substitute for tapioca.)

Formic acid.

Carbazotic acid and its derivatives, made from sewing silk scraps, and used as a substitute for quinine.

Beeswax, used in manufacture of candles, cerates, plasters, and artificial flowers, in modeling and casting, and in medicine.

Honey, used as a preservative, a food, and in medicine as an aperient and demulcent.

(Wax, used in Chinese pharmacy, secreted by the *Coccus pehlah.*)

(Manna, produced by punctures of *Coccus manniparus.*

a'. Manna from the *Tamarix mannifera*, used as food, and in medicine as a purgative.

b. Cedar manna of Mount Lebanon, from *Pinus cedrus.*

c. Arabian manna, from *Hedysarum alliagi.*)

(Eye-powder, made by Chinese from the Telini fly, (*Mylabris cichorii*,) of India.)

f. Derived from crustacea:

Salve-bug of fishermen of Banks, (*Caligus curtus*,) parasite on cod-fish.

Crabs' eyes, or concretions from stomach of astacus, used as an antacid.

g. Derived from worms:

American leech, (*Macrobdella decora*,) used in surgery.

(European leech, (*Hirudo medicinalis*,) introduced into America.)

(African leech, (*Hirudo trochina*,) introduced.)

Leeches used as barometers.

h. Derived from mollusks:

(Cuttle-fish bone of *Sepia officinalis.*) (See under D, III, H.)

Calcined shells, used for building-lime, and in manufacture of dentifrices and enamel. (See under III, H.)

i. Derived from radiates:

a. Limes, derived from calcining coral and coral rock.

30. CHEMICAL PRODUCTS, &c —Continued.

k. Derived from protozoans:

Burnt sponge, formerly used in medicine.

Infusorial earth, and its applications. (See above, under K.)

31. FERTILIZERS.

a. Natural guanos:

Bat guano from caves.

Bird guano from oceanic islands.

b. Artificial guanos:

Menhaden guano.

Herring guano.

White-fish guano.

Other fish guano.

c. Artificial fertilizers:

Bone-dust ground for use.

Bone phosphates.

Dried meat from refuse of slaughter-houses.

Poudrettes.

Other animal fertilizers.

32. LIMES. (See under 30.)

33. OTHER MATERIALS NOT MENTIONED.

[redacted]

SECTION E.

PROTECTION AND CULTURE.

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Apparatus for physical research.

Appliances for working up results.

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Photographs, &c.

II. PROTECTION

2. PRESERVATION OF GAME, FISH, &c.:

* *From man.*

a. Game laws.

** *From artificial obstructions.*

b. Fish-ways:[1]

Gap fish-ways.

Trench, ditch, or "Cape Cod" fish-ways.

Oblique grove fish-ways:

Single groove.

Brewer's.

Mather's.

Step fish-ways:

Box or pool fish-ways:

Overflowing, (old style.)

With passage-way cut down to the floor, (Smith's.)

With passage-way submerged, (Cail's.)

With contracting galleries, (Pike's.)

With transverse-sloping floors, (Steck's.)

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[1] Classification proposed by C. G. Atkins.

2. PRESERVATION OF GAME, FISH, &c.—Continued.

b. Fish-ways:

Steps contrived by arrangement of rocks and bowlders.

Inclined plane without steps:

Plain, (Pennsylvania.)

With partitions at right angles:

"Rectangular compartment."

Brackett's.

With oblique partitions:

Foster's.

Swazey's.

*** *From natural enemies.*

c. Apparatus for destroying injurious species:

Oyster-bed tangles, (see under B, 12.)

3. CARE OF ANIMALS IN CAPTIVITY.

a. Tethers and hopples.

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[redacted]

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   a. Methods of terrapin culture.
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   a. Methods of frog culture.
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      Spawning-race, (Ainsworth.)
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      Spawning-vat, (Bond.)
   b. Hatching-apparatus:
      Troughs:
      Plain.
      Gravel-bottomed.
      With sieve-bottom trays:
         Brackett's.
         Williamson's.
         Clark's.
      Vats or cases:
         Holton's.
         Roth's.
         Glass-grilled boxes, (Coste's.)
      Jars and tin-vessels:
         Bell and Mather's.
         M. A. Green's.
         Ferguson's.
         Chase's.
      Hatching-boxes, (floating:)
         Seth Green's shad-box.
         Brackett's shad-box.
         Brackett's shad-box, (No. 2.)
         Bryant's shad-box.
         Stilwell & Atkins's shad-box.
         Bannister's shad-box.

[1] Classification proposed by J. W. Milner.

9. PROPAGATION AND CULTURE OF FISHES—Continued.

b. Hatching-apparatus:

Hatching-boxes, (floating:)

Adhesive eggs apparatus:

Vertical wire-cloth trays.

Hatching-basket.

Brook shanty, (Furman's.)

(Bay or cove barriers, Professor Rasch's.)

Accessories:

Tanks.

Nests.

Trays.

Grilles.

Gravel-filters.

Flannel screens.

Shallow troughs or tables (for picking eggs.)

Egg-nippers.

Cribbles.

Pipettes.

Skimmer-nets.

Feathering quills and brushes.

Rose-nozzles, (for washing eggs.)

Syringes, bulb, &c.

[redacted]

9. PROPAGATION AND CULTURE OF FISHES—Continued.

c. Transporting apparatus:

Apparatus for transporting fish:

Tanks with aerating accessories:

Tanks, with attachment of band-wheel to car-axle, (Stone's.)

(Tanks, with Freiburg aerating apparatus.)

Aquarium-car, (Stone's.)

Live-box, (Atkins's.)

Accessories:

Air force-pumps.

Siphons.

Siphon-tubes.

Bellows.

Roses, aerating.

10. PROPAGATION OF INSECTS.

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Department of the Interior:

U. S NATIONAL MUSEUM.

— 7 —

BULLETIN

OF THE

TED STATES NATIONAL MUSEUM.

—CONTRIBUTIONS TO THE NATURAL HISTORY OF THE HAWAIIAN AND FANNING ISLANDS AND LOWER CALIFORNIA.

BY

THOS. H. STREETS, M. D.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1877.

Department of the Interior:
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—7—

BULLETIN

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UNITED STATES NATIONAL MUSEUM.

No. 7.

PUBLISHED UNDER THE DIRECTION OF THE SMITHSONIAN INSTITUTION.

WASHINGTON:
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1877.

ADVERTISEMENT.

This work is the seventh of a series of papers intended to illustrate the collections of natural history and ethnology belonging to the United States and constituting the National Museum, of which the Smithsonian Institution was placed in charge by the act of Congress of August 10, 1846.

It has been prepared at the request of the Institution, and printed by authority of the honorable Secretary of the Interior.

JOSEPH HENRY,
Secretary of the Smithsonian Institution.

SMITHSONIAN INSTITUTION,
Washington, April, 1877.

CONTRIBUTIONS

TO THE

NATURAL HISTORY

OF THE

HAWAIIAN AND FANNING ISLANDS

AND

LOWER CALIFORNIA,

MADE IN CONNECTION WITH THE UNITED STATES NORTH PACIFIC SURVEYING EXPEDITION, 1873-75.

BY

THOS. H. STREETS, M. D.,
PASSED ASSISTANT SURGEON, U. S. NAVY.

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PREFACE.

The collections that furnished material for this bulletin* were made, one in 1873–74, by Surgeon William H. Jones, U. S. N., and the writer, while serving on board the United States ship Portsmouth, Commander Joseph S. Skerrett commanding, engaged in the survey of the islands of the North Pacific Ocean; and the other by the writer alone, in 1874–75, while on board the United States steamer Narragansett, Commander George Dewey commanding, engaged in the survey of the coasts of the peninsula of Lower California.

The first collection very well represents the fish-fauna of the harbor of Honolulu and the avi-fauna of the Fanning group. While among the latter islands, our means for the preservation of specimens were too limited to permit of a very extensive collection of fish. A complete botanical collection was made at Palmyra and Christmas Islands. The plants were sent home from the Pacific; and before I arrived there to commence the work of arranging the collection, they had been identified by Prof. A. Gray, and distributed through the general collection of the Agricultural Department at Washington, so that it was impossible to get a list of them except by overhauling the entire collection. The present list, therefore, represents little more than the duplicate series. I am indebted to Prof. Gray and Dr. Vasey, Botanist of the Agricultural Department, for the notes accompanying the list of plants from Lower California.

The Fanning group, with the exception of the Hawaiian, were the only islands visited in the Pacific. This group comprises the islands of Christmas, Fanning, Washington, and Palmyra. They are situated immediately north of the equator from latitude 1° 57′ to 5° 49′, and extend from longitude 157° 27′ W. to 162° 11′ W. Palmyra is the most northern and western, and Christmas the most southern and eastern of the group. From these two came the largest part of our collection. They are uninhabited, save by parties that go there to harvest the crop

* Excepting the Crustaceans, the invertebrate portion of the collection is excluded from this bulletin.

of cocoanuts. They are exclusively coral formations; and all except Christmas are well clothed with vegetation, and are frequently visited by rains.

In regard to the Lower Californian collection, it by no means represents either the fauna or flora of any place or section. The specimens were collected all along the coasts—our stay at any one place being too short to admit of more than a mere cursory examination of its life.

I regret to say that a large collection of birds' eggs from Palmyra and Christmas Islands was completely destroyed by rats on board the ship.

To Dr. Elliott Coues, U. S. A., belongs the credit of the identification of the birds, and he has very kindly furnished me with the notes accompanying that portion of the ornithological collection from the Californian peninsula. I desire to express, in this connection, my obligations to Prof. T. Gill for assistance in the classification of the fishes, and for his advice in other matters relating to my ichthyological work. To both these eminent gentlemen I tender my sincere thanks.

T. H. S.

SMITHSONIAN INSTITUTION,
Washington, D. C., April, 1877.

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ORNITHOLOGY.

SYLVICOLIDÆ.

DENDRŒCA AUDUBONI, (*Towns.*) *Bd.* [No. 70632].

Sylvia audubonii, TOWNS., Jour. Acad. Nat. Sci. Phila., vii, 1837, 190.
Sylvicola audubonii, BP., List, 1838, 21.—AUD., B. Am., ii, 1841, pl. 77.
Dendroica audubonii, BD., B. N. A., 1858, 273.—COUES, Key, 1872, 100; Birds Northwest, 1874, 58.—BD., BREW., & RIDG., N. A. Birds, i, 1874, 229, pl. xiii, f. 1.

Locality: mouth of the Colorado River. Immature plumage; throat scarcely tinged with yellow. One specimen.

FRINGILLIDÆ.

PASSERCULUS SAVANNA ALAUDINUS, (*Bp.*) [No. 70633].

Passerculus alaudinus, BP., Comp. Rend., xxxvii, 1853, 918.—BD., Birds N. A., 1858, 446.
Passerculus savanna alaudinus, BD., BREW., & RIDG., N. A. Birds, i, 1874, 537, pl. xxiv, f. 11.—HENSHAW, Wheeler's Exped., vol. v, 1875, Zoöl., 254.
Passerculus savanna, ALLEN, Bull. Mus. Comp. Zoöl., 1872, 177.—COUES, Birds Northwest, 1874, 127 (in part).

Locality: San Ignacio River, Sonora, Mexico. One specimen. Flew aboard the ship while at anchor, and was captured.

PASSERCULUS SAVANNA ANTHINUS, (*Bp.*) *Cs.* [No. 70634].

Passerculus anthinus, BP., Comp. Rend., xxxvii, 1853, 919.
Passerculus savanna anthinus, COUES, Key, 1872, 136.—BD., BREW., & RIDG., N. A. Birds, i, 1874, 539, pl. xxiv, f. 10.—COUES, Birds Northwest, 1874, 128.

Locality: Todos Santos Islands, Pacific coast of Lower California. One specimen.

PASSERCULUS ROSTRATUS, (*Cass.*) *Bd.* [No. 70635].

Emberiza rostrata, CASSIN, Proc. Acad. Nat. Sci. Phila., vi, 1852, 348.
Ammodramus rostratus, CASSIN, Ill. B. Cal. Tex., &c., i, 1855, 226, pl. 38.
Passerculus rostratus, BAIRD, Birds N. Am., 1858, 446.—BD., BREW., & RIDG., N. A. Birds, i, 1874, 542, pl. 24, f. 12.—COUES, Key, 1872, 136.

Locality: Todos Santos Islands. One specimen. Inseparable from typical *rostratus* of Southern and Lower California (mainland), though

rather larger (wing 2.80, instead of about 2.50; tail 2.10, instea about 1.90). The peculiar turgid shape of the bill and its light-b color, together with the special light reddish-brown tone of all markings of *rostratus*, are repeated with fidelity.

PASSERCULUS GUTTATUS, *Lawr.* [Nos. 70636, 70637].

Passerculus guttatus, LAWRENCE, Ann. Lyc. New York, viii, 1867, 473.
Passerculus rostratus var. *guttatus*, B., B., & R., N. A. Birds, i, 1874, 544.

Resembling *P. rostratus* in the great size of the bill, but with member of a decidedly different shape. In *P. rostratus*, the shape c bill is peculiar in the genus, and very much resembles that of a *Py* in its turgidity, the convexity of the culmen throughout, and othe tures. In *P. guttatus*, the shape of the bill is as in the *Passerculi* erally, but its size is relatively greater. Culmen 0.50 of an inch about straight; depth of bill at base 0.22–0.30. Most or all o upper mandible black; the lower yellowish, with dusky point. Sy of coloration as in other *Passerculi;* the loral line only just apprec tinged with yellowish; yellow of bend of wing obsolete. Genera oration much as in *P. savanna.* Length, as well as can be judged, 5.75 inches; wing 2.75; tail 2.10; tarsus 0.85; middle toe and 0.80; bill as already given.

Two specimens from San Benito Island, Pacific coast of Lower fornia.

This well-marked form has been referred [Check List, No. 160 *a* B., & R., i, p. 544] to *P. rostratus* as a geographical or local race.

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ZONOTRICHIA LEUCOPHRYS INTERMEDIA, *Ridgw.* [No. 70639].

Zonotrichia gambeli, BD., Birds N. A., 1858, 460.
Zonotrichia leucophrys var. *gambeli*, COUES, Key N. A. Birds, 1872, 145 (in part).
Zonotrichia intermedia, YARROW, Rep. Orn. Specs., 1871, Wheeler's Exped., 1874, 35.
Zonotrichia leucophrys var. *intermedia*, RIDGW., MS.—HENSHAW, Wheeler's Geograph. and Geol. Expl. and Surv. West of the 100th Merid., v, 1875, Zoöl., 261, pl. 7, f. 1, 2.

Locality: Los Coronados Islands, near San Diego, Cal.

CALAMOSPIZA BICOLOR, (*Towns.*) *Bp.* [Nos. 70640, 70641, 70642].

Fringilla bicolor, TOWNSEND, Jour. Acad. Nat. Sci. Phila., vii, 1837, 189.
Calamospiza bicolor, BP., List, 1838, 30.—BD., Birds N. Am., 1858, 492.—COUES, Key, 1872, 147; Birds Northwest, 1874, 163.—BD., BREW., & RIDG., N. A. Birds, ii, 1874, 61, pl. 29, f. 2, 3.
Corydalina bicolor, AUD., Syn., 1839, 130.
Dolichonyx bicolor, NUTT., Man., i (2d ed.), 1840, 203.

Localities: Angel Island and Pichilinque Bay, Gulf of California. Three specimens.

GONIAPHEA MELANOCEPHALA, (*Sw.*) *Gray* [No. 70643].

Guiraca melanocephala, SW., Philos. Mag., i, 1827, 438.—BD., Birds N. Am., 1858, 498.
Coccothraustes melanocephalus, RICH., Pr. Brit. Assoc. for 1836 (1837).
Pitylus melanocephalus, GRAY, Gen. of Birds, ii, 362.
Fringilla melanocephala, AUD., Orn. Biog., iv, 1838, 519, pl. 373.
Coccoborus melanocephalus, AUD., Syn., 1839, 133.
Hedymeles melanocephalus, CAB., Mus. Hein., i, 1851, 153.—BD., BREW., & RIDG., N. A. Birds, ii, 1874, 73, pl. 30, f. 1, 2.
Goniaphea (*Hedymeles*) *melanocephala*, GRAY, Hand-list, No. 7547.
Goniaphea melanocephala, COUES, Key, 1872, 149; Birds Northwest, 1874, 167.
Fringilla xanthomaschalis, WAGL., Isis, 1831, 525.

Locality: Pichilinque Bay, near La Paz. One specimen.

CORVIDÆ.

CISSILOPHA SANBLASIANA, (*Lafr.*) *Bp.* [No. 70644].

Geai de San Blas, NÉBOUX, Rev. Zool., 1840, 290, 323.
Pica sanblasiana, LAFR., Mag. de Zool., 1842, Ois., t. 28.
Cyanocorax de San-Blas, PREV. & DES MURS, Voy. Vénus, v, 200.
Cissilopha sanblasiana, BP., Consp., i, 380.—LAWRENCE, Mem. Boston Soc. Nat. Hist., ii, 284.
"*Cyanurus geoffroii*, BP.", Gray, Hand-list, ii, 4.
Cyanocitta sanblasiana, SCL. & SALV., Proc. Zoöl. Soc. London, 1876, 269.

Locality: Mita Point, Sinaloa, Mexico. One specimen. Identical

with unquestioned examples of this species, except in the lack of any decided crest, though the feathers of the part are somewhat full. Bill jet-black, and the feet are blackish. In this and various allied jays of the black-bellied section of the genus *Cyanocitta*, it appears that the bill, and even the feet, may be indifferently either yellow or black. The *C. crassirostris* Bp. was separated from *C. beecheyi* partly on account of its black instead of yellow bill, but has, however, other and better specific characters.

TYRANNIDÆ.

TYRANNUS VOCIFERANS, *Sw.* [No. 70645].

Tyrannus vociferans, Sw., Quart. Jour. Sci., xx, 1826, 273.—Bd., Birds N. Am., 1858, 174.—Coues, Key, 1872, 170, f. 110d.—Bd., Brew., & Ridg., N. A. Birds, ii, 1874, 327, pl. 43, f. 5.—Coues, Birds Northwest, 1874, 238.

Laphyctes vociferans, Cab., Mus. Hein., ii, 1859, 77.

Tyrannus cassini, Lawr., Ann, Lyc. New York, v, 1852, 39, pl. 3, f. 2.

Locality: Bay of Santa Tomas, Pacific coast of Lower California. One specimen.

MYIARCHUS CINERASCENS, (*Lawr.*) *Scl.* [No. 70646].

Tyrannula cinerascens, Lawr., Ann. Lyc. New York, v, 1851, 109.

Myiarchus cinerascens, Scl., Ibis, 1859, 121.—Coues, Key, 1872, 171; Birds Northwest, 1874, 239.

Myiarchus crinitus cinerascens, Bd., Brew., & Ridg., N. A. Birds, ii, 1874, 337, pl. 43, f. 6.

Myiarchus mexicanus, Bd., Birds N. Am., 1858, 179 (nec Kaup; nec Lawr., Ann. Lyc. New York, ix, 1869, 202).

Myiarchus mexicanus pertinax, Bd., Proc. Acad. Nat. Sci. Phila., 1859, 303.

TRICHOGLOSSIDÆ.

CORIPHILUS KUHLI, (*Vigors*) *Wagler* [Nos. 67314, 67358, 67333].

Psittacula kuhli, VIGORS, Zoöl. Jour., 1824, 412, pl. 16.
Psittacus kuhli, LESS., Voy. Coq., 1828, 629.
Lorius kuhli, LESS., Tr. d'Orn., 193.
Vini coccineus, LESS., Ill. de Zool., 1832, t. 28.
Coriphilus kuhli, WAGLER, Mon., 566.
Psittacula interfringillacea, BOURJ., Perr., t. 83.
Brotogeris kuhli, SWS., Class. of Birds, ii, 303.
Domicella kuhli, FINSCH, Die Papageien, ii, 1868, 749.

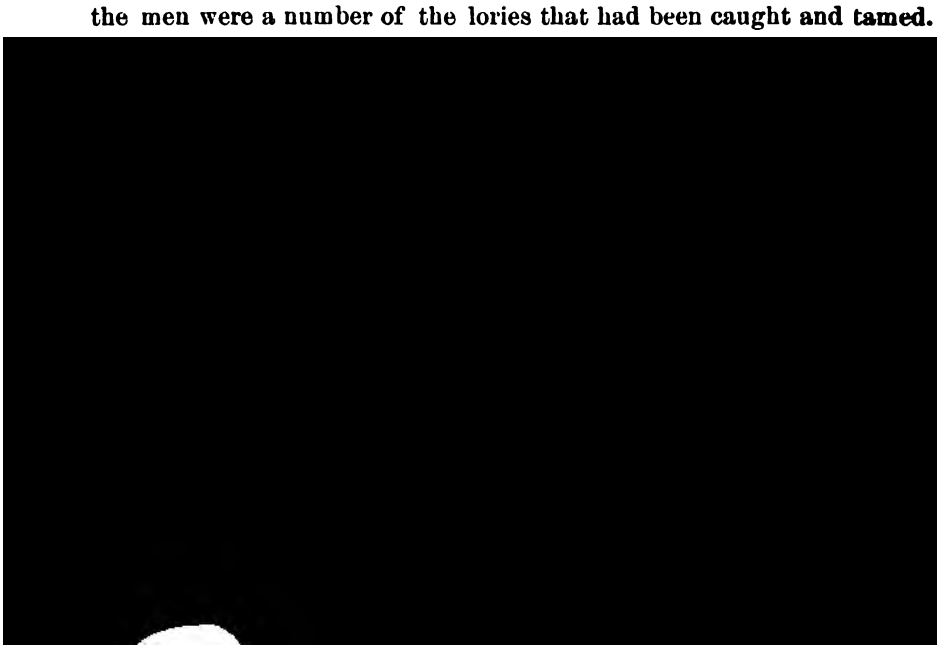
Locality: Washington Island, Fanning group, North Pacific Ocean. Three specimens.

This bird is so rare in museums that a technical description of it will not be out of place in this connection. Bill short and stout, slightly shorter than the tarsus; upper mandible much hooked; tarsus and feet short and stout. The under surface of the neck and extending half-way around on the sides, the side of the head below the eyes, the breast, and the abdomen bright scarlet; the same color extends up on the side of the head at the base of the bill to very near the nostril. The scarlet color is confined to the terminal portion of the feather; the basal half is grayish-brown, slightly tinged with green—under the wings the green color predominates on the basal half. The lower portion of the tibia violet; the lengthened feathers of the crest green on the forehead and purple on the top and back of the head; the back and upper wing-coverts green; rump and upper tail-coverts greenish-yellow; the colors of the rump, abdomen, and tibia mingle on the long feathers of the thigh; a short line of yellow sprinkled with red at the bend of the wing; the short under wing-feathers green; the rest of the under surface of the wing grayish-brown, glossy in appearance; a narrow line of light blue on the outer margin of the wing; the edge of the outer web of two or three of the longest primaries margined with the same color; the margins of the other primaries green; the rest of the outer web, the shaft, and the inner web of the primaries and secondaries, as well as the apices of the primaries, brownish-black; the under tail-coverts scarlet and yellow, a mixture of the colors of the rump and abdomen; the outer web of the tail-feathers violet; the inner scarlet, tips green. Lower mandible yellow; upper light brown; tarsus and feet light brown.

Total length about 8.00 inches; bill from feathers on the side of the head 0.50; wing 5.20; tail 3.20; tarsus 0.60; middle toe 0.65; claw 0.30.

The following concerning this bird is taken from Finsch's "Die Papageien":—"This is one of the rarest parrots existing. It is to be found only in a few museums. It was erroneously said by Wagler to come from the Sandwich Islands. Latterly, this rare species does not seem to come to Europe at all, which is surprising, inasmuch as the Society Islands, which thus far have been regarded as their only home, have considerable traffic with Europe. As a special locality, Vigors mentions the island of Tuhutitiruha [*sic*] near Tahiti; Lesson gives Borabora. Bourjot's specimen in the Paris Museum is said to have come from Fanning Island, northwest of Christmas, and northeast of the Phœnix group. But, although everything is diametrically opposed to this statement, it may, nevertheless, not be improbable that this very island is its true home."

From the foregoing statement, it is evident that much uncertainty existed in regard to the habitat of *C. kuhli*, with the weight of the testimony inclining toward the Society Islands. It is our pleasure to have dispelled the doubt, and to have assigned the bird to its only true homes,—Washington and Fanning islands of the Fanning group. It is quite natural that such an opinion should prevail, and it is thus that we would account for it. Natives of the southern groups visit these islands periodically, to make cocoanut-oil. We found a party of them on Washington Island at the time of our visit, and in the possession of the men were a number of the lories that had been caught and tamed.



of the body being finished off with bright red, the neck of a golden color, back a lively green, with a yellow beak, except the very points, which were of a light dun color, the wings and tail being both of a jet black, and the last tipped off with white; it was a most beautiful and lovely bird, with its brilliant and richly variegated plumage. We were much chagrined, while observing these, to see a man-of-war hawk flying by with one in his mouth, apparently having just caught it." If we are allowed to state our own opinion in regard to the last sentence of this quotation, we would suggest that it was the red throat of the man-of-war hawk, and not a parrot, which our narrator saw.

When the islander wishes to take the lories alive, he provides himself with two pieces of bamboo, each about a yard long. On the end of one he perches a tame bird, and from the extremity of the other suspends a short running noose made of cocoanut-fibers. The decoy bird as it is carried about among the cocoanut-trees utters a harsh, rasping sound, and wild birds fly down from the trees and alight alongside it on the bamboo stick, when by means of the other stick they are skillfully noosed.

When caged aboard the ship, they exhibited as pretty a picture of love as one can imagine, well meriting their name of "*love-birds*". They sat billing and smoothing each other's feathers for hours, and as night came on two would get together and sleep with heads turned toward each other. They lived in confinement but a very short time and bore it badly. At times, even while we stood watching their lively antics, one would tumble off its perch and die, apparently in convulsions.

The islands on which these birds are found are very small, and it would not require a very great effort to totally exterminate them.

STRIGIDÆ.

OTUS BRACHYOTUS, (*Gm.*) *Boie* [No. 67365].

Strix brachyotus, GM., Syst. Nat., i, 1788, 289.

Otus brachyotus, BOIE, Isis, 549.

Brachyotus palustris, GOULD, B. Eur., pl. 40.—COUES, Key N. A. Birds, 1872, 204; Birds Northwest, 1874, 306.

Brachyotus cassini, BREW., Proc. Boston Soc., 1856.—BD., Birds N. Am., 1858, 54.

Otus (*Brachyotus*) *brachyotus*, BD., BREW., & RIDG., N. A. Birds, iii, 1874, 22.

Locality: Talcahuano, Chili. One specimen.

FALCONIDÆ.

PANDION HALIÆTUS, (*Linn.*) *Cuv.* [No. 70648].

Falco haliætus, LINN., Syst. Nat., i, 1766, 129.

Pandion haliætus, CUV., Règne Anim., i, 316.—COUES, Key N. A. Birds, 1872, 219; Birds Northwest, 1874, 367.

Pandion carolinensis, BP., List, 3.

Pandion haliætus var. *carolinensis*, RIDG., Proc. Acad. Nat. Sci. Phila., 1870, 143.——BD., BREW., & RIDG., N. A. Birds, iii, 184.

Pandion leucocephalus, GOULD, Syn. B. Aust., i, 22; Birds Aust., pl. 6.

Pandion haliætus var. *leucocephala*, RIDG.—BD., BREW. & RIDG., N. A. Birds, iii, 183.

Locality: San Geronimo Island, Pacific coast of Lower California. One specimen. We observed a number of old nests on this island, built, in the absence of trees, upon high points of rock. At a place on the gulf coast of the peninsula, an osprey was observed breeding in February, and we procured some of its eggs.

CHARADNIDÆ.

SQUATAROLA HELVETICA, (*Linn.*) *Brehm* [No. 70549].

Tringa helvetica, LINN., Syst. Nat., i, 1766, 250.

Squatarola helvetica, BREHM, V. D., 554.—BD., Birds N. Am., 697.—COUES, Key N. A. Birds, 243; Birds Northwest, 448.

Vanellus helveticus, VIEILL., Ency. Méth., iii, 1077.

Charadrius helveticus, LICHT., Verzeich., No. 728.—AUD., Orn. Biog., iv, 280, pl. 334.

Charadrius (*Squatarola*) *helvetica*, RIDG., Ann. Lyc. N. Y., x, 1874, 383.

Tringa varia, LINN., Syst. Nat., i, 1766, 252.

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Pluvialis taitensis, Bp, C. R., 417.
Charadrius virginianus, Jard. & Selt., Ill., ii, pl. 85.
Charadrius glaucopus, Forst., Descr. An., ed. Licht., 1844, 176.
Charadrius longipes, "Temm. Mus. Lugdun."
Pluvialis longipes, Bp., C. R., 417.
Charadrius auratus orientalis, Temm. Schl., Faun. Japon., pl. 62.
Charadrius auratus, Schrenck, Reise Amur, 1860, 410.

Locality: Oahu, Hawaiian Islands. Two specimens. In regard to the habits of these birds, we were informed by residents of the island that they make their first annual appearance about September. When they arrive, they are very poor and weak, having evidently been on a lengthy voyage and been deprived of food for a long time. During their stay through the winter, they become very fat. About March or April, they begin to prepare for their departure. They can be seen during the day, at this time, taking long or short flights out at sea and returning again to the island. This exercise is undoubtedly for the purpose of strengthening themselves for the final effort—their muscles during their winter's life of luxury and ease having become flabby and feeble. We have met them at sea, a long distance from any land, very much exhausted, and have known them to take refuge aboard the ship, where, if not molested, they would remain until we neared land.

HÆMATOPODIDÆ.

HÆMATOPUS NIGER, *Pallas* [No. 70650].

Hæmatopus niger, Pallas, Zoog. Rosso-Asiat., ii, 1811, 131.—Coues, Key N. A. Birds, 1872, 246.
Hæmatopus bachmani, Aud., Orn. Biog., v, 1839, 245, pl. 427.

Locality: Saint Martin's Island, Pacific coast of Lower California. One specimen.

STREPSILAS INTERPRES MELANOCEPHALUS, (*Vig.*) *Coues* [No. 70651].

Strepsilas melanocephalus, Vig., Z. J., iv, 1829, 356.—Cass., Baird's N. Am. Birds, 1858, 702.
Strepsilas interpres var. *melanocephalus*, Coues, Key N. A. Birds, 1872, 246; Birds Northwest, 1874, 459.

Locality: San Geronimo Island. One specimen. A characteristic example of this peculiar form, entirely dusky and white, without a trace of rufous coloration. The feet also are dark-colored, being apparently blackish-olive.

SCOLOPACIDÆ.

TRINGA MINUTILLA, *Vieill.* [Nos. 70652, 70653, 70654, 70655.]

Tringa minutilla, VIEILL., Nouv. Dict. d'Hist. Nat., xxxiv, 1819, 452.—COUES, Key N. A. Birds, 1872, 254; Birds Northwest, 1874, 482.

Actodromus minutilla, BP., Comp. Rendus, 1856.

Actodromas minutilla, COUES, Proc. Acad. Nat. Sci. Phila., 1861, 191, 230.

Tringa pusilla, WILS., Am. Orn., v, 1813, 32, pl 37, f. 4 (not of European writers).

Pelidna pusilla, BP., List, 1838, 50.

Tringa wilsoni, NUTT., Man., ii, 1834, 121.—BD., Birds N. Am., 1858, 721.

Actodromus wilsoni, BP., Comp. Rendus, 1856.

Locality: San Geronimo Island. Several specimens.

CALIDRIS ARENARIA, (*Linn.*) *Illiger* [Nos. 70656, 70657, 70658].

Tringa arenaria, LINN., Syst. Nat., i, 1766, 251.

Calidris arenaria, ILL., Prod., 1811, 249.—BD., Birds N. Am., 1858, 723.—COUES, Key N. A. Birds, 1872, 257, f. 167; Birds Northwest, 1874, 492.

Charadrius calidris, LINN., Syst. Nat., i, 1766, 255.

Arenaria calidris, MEYER, Tasch. Deutschl. Vög., 68, pl. 59, f. 4.

Charadrius rubidus, GM., Syst. Nat., i, 1788, 688.

Arenaria vulgaris, BECHST., Tasch. Deutschl., ii, 462.

Arenaria grisea, BECHST., Naturg. Deutschl., iv, 368.

Calidris grisea, BREHM, Vög. Deutschl., 674.

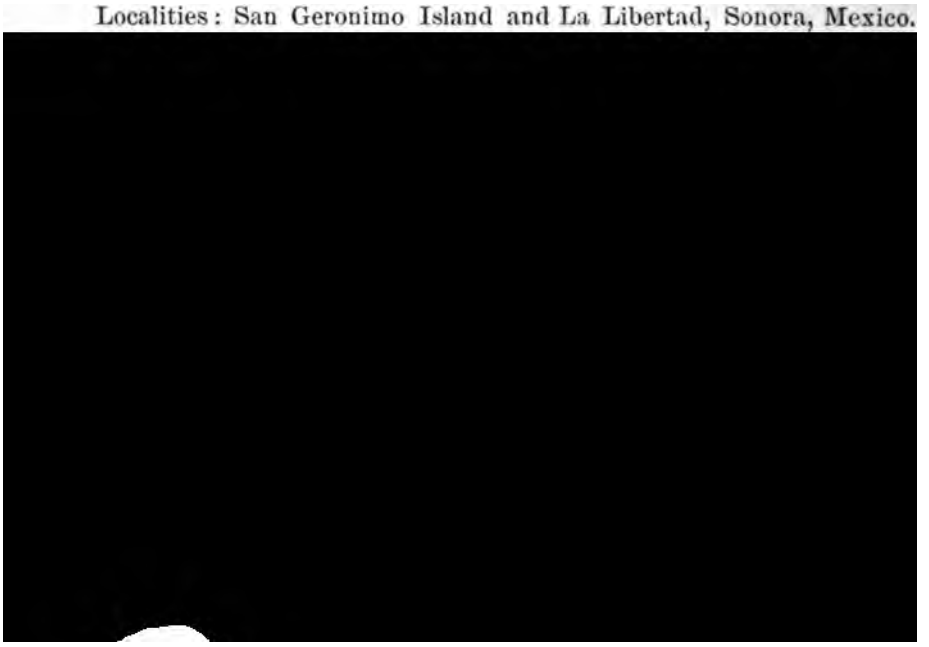
Trynga tridactyla, PALL., Zoog. R.-A., ii, 1811, 198.

Calidris tringoides, VIEILL., Gal. Ois., ii, 1834, 95, pl. 234.

Calidris americana, BREHM, Vög. Deutschl., 1831, 695.

Calidris nigellus, VIEILL. (vide Gray's Hand-List, No. 10324).

Localities: San Geronimo Island and La Libertad, Sonora, Mexico.



HETEROSCELUS INCANUS, (*Gm.*) *Coues* [No. 67321].

Scolopax incana, GMEL., Syst. Nat., i, 1788, 658,
Tringa glareola, PALLAS, Zoog. Ross.-As., ii, 1811, 194, pl. 60.
Totanus brevipes, VIEILL., Nouv. Dict. d'Hist. Nat., vi, 1816, 410.
Scolopax undulata, FORST., Descr. An., ed. Licht, 1844, 173.
Scolopax pacifica, FORST., Descr. An., ed. Licht., 1844, 174.
Totanus oceanicus, LESS., Consp. Buff,, 1847, 244.
Totanus polynesiæ, PEALE, U. S. Expl. Exped., Orn., 1848, 237.
Totanus fuliginosus, GOULD, Voy. Beagle, Birds, 1841, 130.
Heteroscelus brevipes, BD., Birds N. Am., 1858, 734, pl. 88.
Heteroscelus incanus, COUES, Key N. A. Birds, 1872, 261.

Locality: Palmyra Island, Fanning group, North Pacific Ocean.

NUMENIUS FEMORALIS, *Peale* [No. 67336].

Numenius femoralis, PEALE, U. S. Expl. Exped., Orn. 1848, 233, pl. 37.—COUES, Check-list N. A. Birds, 1874, 135.

Locality: Palmyra Island. Very abundant on this island. A few only were seen on Christmas and the other islands of the group.

RALLIDÆ.

GALLINULA SANDVICENSIS, *Streets* [No. 67361].

"*Gallinula chloropus* AUD."(=*G. galeata*), PEALE, U. S. Expl. Exped., Orn., 1848, 220 (nec auct.).
Gallinula sandvicensis, STREETS, Ibis, i, 4th series, 1877, p. 25, fig.

Frontal plate very large, terminating squarely on the top of the head, much inflated, the posterior margin on a line with the posterior border of the orbit; latterly, it encroaches on the orbit, being separated from it by a very narrow feathered space; the bill shorter than the head, thick, compressed; wings rather short in proportion to the size of the species, when compared with other species of the same group; first primary shorter than the second; second and third of equal lengths, the rest graduated; tail short; tarsus rather long and stout, rounded in front, and compressed posteriorly; toes and claws long and robust.

The entire under surface of the body of one color, which is a dark slaty; no marks of white on the abdomen; the head and neck all around much darker than the rest of the body—nearly black, with a slight brownish tinge; a few of the long feathers of the flanks with long spots of white on the superior web; the edge of the wing at the bend, and the external margin of the outer web of the first primary marked with a very constricted line of white; the under surface of the wing of the

same color as the under parts of the body; the longer under tail-coverts pure white, the rest black; the entire upper parts, including the upper surfaces of the wings and tail, olive-brown; this color deepest on the rump, and fading out on the neck and the exterior portions of the wings; the tips of the tail-feathers, and the shafts of the feathers brownish-black.

The frontal plate and bill bright crimson, the latter tipped with yellow; the tibia naked for about an inch, and surrounded by a bright crimson ring; a decided crimson blush on the front of the tarsus, the color deepens on the sides; feet pea-green.

Total length about 13.50 inches; wing 6.50; tail 3.00; bill along the commissure 1.20; from the feathers on the side of the head 1.00; along the culmen, including the frontal plate, 1.65; breadth of the frontal plate 0.50; length, from the margin of the feathers on the side of the bill, 0.70; tarsus 2.00; middle toe and claw 3.00.

To sum up;—the proportions of *Gallinula sandvicensis*, and the quadrate form of the frontal plate show that its strongest affinities are with *Gallinula galeata*, rather than with any other member of the group; but the greater extent of the frontal plate, the shorter wing, the absence of white on the abdomen and on the under surface of the wing, as well as its reduction to a mere trace on the margin of the latter, the more robust and different form of the tarsus, being broader and more rounded in front, as well as the great difference in the color of the tarsus, are characters which separate it immediately from *G. galeata*, and render its identification easy. The characters just enumerated, in addition to its

Samoa-, und Tonga-Inseln." It is highly probable that both of these authorities based their statements upon Peale's original reference.

FULICA ALAI, *Peale* [No. 67360].

Fulica alai, PEALE, U. S. Expl. Exped., 1848, Orn., 224, pl. lxiii, f. 2.

Locality: Oahu, Hawaiian Islands.

ANATIDÆ.

CHAULELASMUS COUESI, *Streets* [Nos. 67324, 67325].

Chaulelasmus couesi, STREETS, Bulletin of the Nuttall Ornithological Club, vol. i, No. 2, 46.

Bill nearly as long as the head, about as deep as broad at the base, depressed anteriorly, sides nearly parallel, converging slightly toward the base; tip rounded, and unguis abruptly curved; frontal angle short and obtuse; dorsal line at first sloping—rather more so than in *C. streperus*—anterior portion broad, straight, and flattened. Internal lamellæ numerous, small and closely packed, about seventy-five in number—in *streperus* only about fifty. Nostrils sub-basal, lateral, large, oblong.

Plumage (immature).—Head above dark brown, the apical portion of the feathers of a lighter shade than the basal, those on the frontal region with the central portion black, and the edges brownish-white; throat and sides of head brownish-white, a small brown spot at the extremity of each feather, shafts brown, on the lower portion of the neck, and on breast all around the feathers are marked with concentric bars of black and light reddish-brown; under surface of the body white, with a broad dark band across the extremity of each feather, giving to this region a mottled appearance; toward the tail, the white of the abdomen assumes a dull reddish-brown tinge; a decided brownish-red color on the flanks, and on the sides of the body covered by the wings. On the back, the plumage is more mature. Color dark brown, marked transversely with fine wavy lines of black and white; scapulars dark brown, fringed with a narrow rim of reddish-brown; middle wing-coverts chestnut; the greater a velvety-black; speculum pure white, the inner webs of the white feathers being grayish-brown; on the third feather of the speculum, counting from within, the white gives place to a hoary-gray, with a black outer margin; the primaries light brown, with the portions of both webs nearest the shaft somewhat lighter. Tail containing fourteen feathers; color hoary plumbeous-gray, under surface lighter and shining; under tail-coverts crossed by transverse bars of

black and white; upper coverts composed of dark brown and black feathers intermingled. Under wing-coverts and axillars pure white. Bill and feet black; the inner side of the tarsus is perceptibly lighter than the feet. Tibia bare for about half an inch.

Length 17 inches; wing 8; tarsus 1.40; commissure 1.65; culmen 1.45; height and breadth of bill at base 0.55; average width of bill 0.55. First toe 0.30; second 1.48, including claw shorter than the third toe without claw; third toe 1.88 without claw, longer than the outer toe without claw; outer toe 1.75.

A female is similar, but with little trace of the peculiar wing-markings, both chestnut and black being wanting, and the speculum being hoary-gray instead of white. Both the specimens before me are immature; the adults, it is presumed, will show the peculiar vermiculated appearance of *C. streperus*. They resemble the immature condition of *C. streperus* so closely that one description of the coloration would answer for both species; but the *C. couesi* is immediately distinguished by its greatly inferior size, which hardly exceeds that of a teal, the different color of the bill and feet, and the singular discrepancy in the lamellæ of the bill, which are much smaller, and one-third more numerous.

Locality: Washington or New York Island, Fanning group.

The discovery of this duck is highly interesting from the fact that it is the second known representative of a genus that is almost world-wide in its distribution. The present species is as restricted in its habitat as the other is wide spread—being confined to the limited area of a coral

name *fiber* should be used as a synonym of *Sula piscator*, having been given by Linnæus to the young of that species.

Locality: Tiburon Island, Gulf of California. This is an abundant species in the gulf. It was breeding in April. The nest from which our specimen was taken contained two eggs, differing remarkably in size: one measuring 2.35 by 1.70; the other only 2.20 by 1.50. They are of the usual elliptical shape, greenish-white, with the ordinary, thick, white, calcareous incrustation.

SULA PISCATOR, (*Lynn.*) *Bp.* [Nos. 67319, 67327, 67332].

Pelecanus piscator, LINN., Syst. Nat., i, 1766, 217.
Sula candida, BRISS., Steph. Gen. Zoöl., xiii, 1826, 103.
Sula erythrorhyncha, LESS., Traité, i, 1831, 601.
Sula rubripes, GOULD, Proc. Zoöl. Soc. London, 1837, 156.
Sula rubripeda, PEALE, U. S. Expl. Exped., Orn., 1848, 274.
Sula piscator, BP., Consp. Av., ii, 1857, 166.

Locality: Fanning group, North Pacific. Several specimens were taken at sea in the vicinity of this group of islands. When far away from land, they flew aboard the ship in the evenings, and roosted on the yards. They exhibited no signs of fear, but were easily captured by the men who went aloft. In the majority of our specimens, the tail is dark—it is white in the adult plumage. On Palmyra Island, their principal breeding-place, the period of their incubation was over at the time of our visit in December, but the young were not yet fledged. The latter were very numerous; they covered the trees and bushes, and looked like great balls of snow-white down. The nests are rudely constructed of coarse twigs, and are built on the low trees.

We arrived at Christmas Island one month later, in January, and there we found the gannets still sitting on their eggs; few or no young were to be seen. This difference is probably induced by the physical conditions surrounding them. One of the islands is situated almost directly on the equator, exposed to the fiercest rays of a tropical sun; it is devoid of fresh water, and it rarely or never rains; the vegetation is scanty and stunted, and life in general has a very unequal struggle for existence. On the other island, Palmyra, a condition of things directly opposite to these exists. The gannets of Christmas Island have a very curious habit, which, as far as our observations extended, is confined to those of that island. Under their nests, which were quite low on account of the stunted condition of the shrubbery, were mounds one and two feet high, built of twigs, and in some instances

solidly cemented together by their excrement. It probably affords them diversion during the monotonous period of incubation to break off all the twigs within reach of their bill, and to drop them under their nests. These mounds furnish evidence of the nests being occupied for several successive years; for the lean bushes could not furnish a sufficient amount of twigs to build them up in a single breeding-season.

One is the usual number of eggs, though sometimes two were found in the same nest. They are somewhat larger, but in every other respect similar to the eggs of *Sula leucogastra*.

SULA CYANOPS, *Sunder.* [Nos. 67315, 67316].

Dysporus cyanops, SUNDEV., Phys. Tidskr. Lund., 1837, pt. 5.
Sula cyanops, SUNDEV., Isis, 1842, 858.
Sula personata, GOULD, Proc. Zoöl. Soc. London, 1845, 21.
Sula piscator, PEALE, U. S. Expl. Exped., Orn., 1848, 273.

Locality: Christmas Island. One specimen in immature plumage. The whole of the upper surface of the body dark brown, mottled with white. The brown color of the back and upper surface of the wings has a grayish tinge; the head and neck all around dark brown, as in *S. leucogastra*, except that the dark color does not extend as far down on the breast as in the latter. The general system of coloration is much the same as in *leucogastra*. If we are to learn anything from the transitional plumages of birds, may it not be that they show us the parent types from which the species are progressively developed? Many instances might be mentioned where the immature plumages of birds represent the perfect plumage of some closely allied species.

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Pelecanus rigna, VIEILL., Enclyclop. Méthod., i, 1823, 342.
Haliæus brasilianus, LICHT., Doubl. d. Zool. Mus., 1823, 86, 908.
Graculus brasilianus, GRAY, Gen. of Birds, t. — .
Phalacrocorax graculus, GOULD, B. of Eur., t. 408.
Phalacrocorax niger, KING, Zoöl. Jour., iv, 1828, 101, sp. 63.
Carbo mystacalis, LESS., Traité d'Orn., 1831, 604.
Carbo brasilianus, SPIX, Av. Brasil, ii, 1824, t. 106.
Zaramagullon negro, AZARA, Apunt. Hist. Nat. Páxaros del Paraguay, &c., iii, —, 395, 423.

Locality: Concepcion Bay, Chili.

TACHYPETIDÆ.

TACHYPETES MINOR, (*Gm.*) *Illig.* [No. 67320].

Pelecanus minor, GM., Syst. Nat., i, 1788, 572.
Pelecanus palmerstoni, GM., Syst. Nat., i, 1788, 573.
Fregata minor, BR., Av., vi, 1760, 509, sp. 7.
Tachypetes minor, ILLIG., Prodro., 1811.
Attagen ariel, GOULD, Birds of Austr., vii, t. 72.
Tachypetes ariel, GRAY, Gen. Birds, t. 185.

Localities: Christmas and Palmyra Islands. One of the specimens a young bird with a white head. Not very abundant. They were not breeding on any of the islands at the time of our visit.

PHÆTHONTIDÆ.

PHÆTHON RUBRICAUDUS, *Bodd.* [Nos. 67329, 67330].

Phaethon rubricauda, BODD., Tabl. Pl. Enl. d'Aub., 1783, 57.—BUFF., Pl. Enl., 979.
Phaethon phœnicurus, GM., Syst. Nat., i, 1788, 583.
Phaethon ætherius, BLOXH., Voy. Blonde, 1826, 251.
Phœnicurus rubricauda, BP., Consp. Av., ii, 1857, 183.

Locality: Christmas Island. Two specimens. One in immature plumage. The feathers of the whole upper surface of the head, neck, and body marked with transverse bars of black and white. Bill black. The elongated central tail-feathers absent. These birds were brought to the ship by the sailors from a distant part of the island. They were taken from off their nests, which were on the ground under low bushes. Egg white, speckled with brown.

LARIDÆ.

LARUS ARGENTATUS OCCIDENTALIS, (*Aud.*) *Cs.* [No. 70664].

Larus occidentalis, AUD., Orn. Biog., v, 1839, 320.
Glaucus occidentalis, BRUCH., J. f. O., 1853, 101.

Laroides occidentalis, BRUCH., J. f. O., 1855, 282.

Larus argentatus var. *occidentalis*, COUES, Key N. A. Birds, 1872, 312; Birds Northwest, 1874, 626.

Locality: Lower California. In perfect breeding-plumage, well illustrating this form in the strength of the bill, slaty-grayish shade of the mantle, &c.

LARUS (BLASIPUS) HEERMANNI, *Cass.* [Nos. 70665, 70666, 70667].

Larus heermanni, CASS., Proc. Acad. Nat. Sci. Phila., vi, 1852, 187; Illus., 1853, 28, pl. 5.

Larus (*Blasipus*) *heermanni*, SCL. & SALV., Proc. Zoöl. Soc. London, 1871, 574.—COUES, Birds Northwest, 1874, 641.

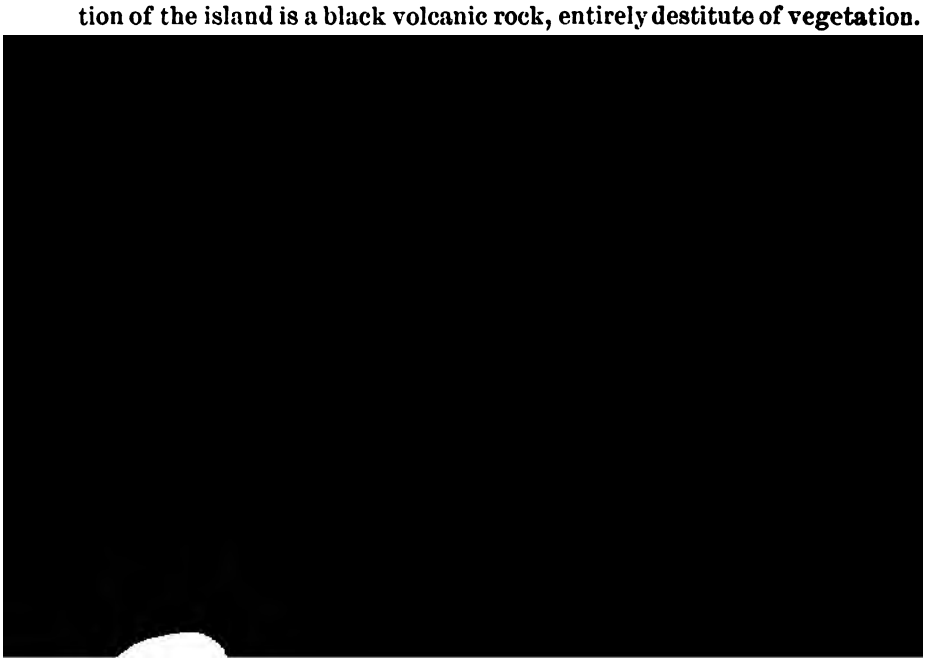
Blasipus heermanni, BP., Consp. Av., ii, 1856, 211.

Adelarus heermanni, BRUCH., J. f. O., 1853, 107; 1855, 279.

Larus belcheri, SCHL., Mus. P.-B., Lari, 9 (in part).

Larus (*Balsipus*) *belcheri*, COUES, Key N. A. Birds, 1872, 314 (in part).

Locality: Isla Raza, Gulf of California. Isla Raza is the particular breeding-place of these gulls in the gulf. It is a small, low island, about three-quarters of a mile long and half a mile wide. At the time of our visit (April), immense numbers of the birds were congregated there, preparatory to laying their eggs, which, however, they had not begun to deposit. We may safely say, without exaggeration, that there was a bird on every square foot of the ground, and others were continually hovering about overhead. Their incessant noise deadened all other sounds, and so intent were they in their all-absorbing duties of reproduction, that they seemed entirely unconscious of our presence amongst them. The formation of the island is a black volcanic rock, entirely destitute of vegetation.



HYDROCHELIDON LARIFORMIS, (*Linn.*) *Coues* [Nos. 70661, 70662].

Rallus lariformis, LINN., Syst. Nat., i, ed. 10, 1758, 153.
Sterna fissipes, LINN., Syst. Nat., i, 1766, 228.
Hydrochelidon fissipes, GRAY, Gen. of Birds, iii, 1849, 660.—COUES, Key, 1872, 323.
Sterna nigra, BRISS., Av., vi, 1760, 211, pl. 20. f. 1.
Hydrochelidon nigra, BOIE, Isis, 1822, 563.
Hydrochelidon nigrum, BP., List, 1838, 61.
Viralva nigra, LEACH, Gen. Zoöl., xiii, 1826, 167.
Sterna nævia, LINN., Syst. Nat., i, 1766, 228.
Sterna surinamensis, GM., Syst. Nat., i, 1788, 604.
Hydrochelidon surinamensis, BP., Comptes Rendus, 1856, 772.
Hydrochelidon (*Pelodes*) *surinamensis*, GRAY, Hand-List, iii, 1871, 122, No. 11074.
Hydrochelidon nigricans et *obscura*, BREHM, V. D., 1831, 794, 795.
Sterna plumbea, WILS., Am. Orn., vii, 1813, 83, pl. 60.
Hydrochelidon plumbea, LAWR., B. N. A., 1858, 864.
Hydrochelidon lariformis, COUES, Birds Northwest, 1874, 704.

Locality: Mita Point, Sinaloa, Mexico. Taken in May, at which period one had completed its breeding-dress, while the other had only begun to change its winter plumage.

STERNA (HALIPLÀNA) FULIGINOSA, *Gm.* [Nos. 67322, 67328, 67334].

Sterna fuliginosa, GM., Syst. Nat., i, 1788, 605.
Sterna (*Onychoprion*) *fuliginosa*, GRAY, List Br. B., 1863, 242.
Sterna (*Haliplanes*) *fuliginosa*, BLAS., List B. Eur., 22.
Sterna (*Haliplana*) *fuliginosa*, COUES, Key N. A. Birds, 1872, 322; Birds Northwest, 1874, 698.
Onychoprion fuliginosa, WAGL., Isis, 1832, 277.
Haliplana fuliginosa, WAGL., Isis, 1832, 1224.
Hydrochelidon fuliginosum, BP., List, 1838, 61.
Sterna serrata, FORST., Descr. An., ed. Licht, 1844, 276.
Onychoprion serrata, WAGL., Isis, 1832, 277.
Haliplana serrata, BP., Comptes Rendus, 1856, 772.
Sterna guttata, FORST., Descr. An., ed. Licht., 1844, 211.
Anous l'herminieri, LESS., Descr. Mammif. et Ois. 1847, 255.
Sterna luctuosa, PHIL. & LANDB., Wieg. Arch., 1866, 126.
Sterna fuliginosa var. *crissalis*, BD., apud LAWR., Proc. Boston Soc., 1871.

Locality: Palmyra Island, Fanning group. They were particularly abundant on this island only. We arrived amongst them at the commencement of their breeding-season. The spot which they had chosen for breeding purposes was the extreme eastern or windward point of the island, within a stone's throw of the breakers. They breed in commu-

nities; and so numerous were they on this occasion that they formed a cloud when they arose from the ground, and their clamor deadened the roar of the surf. They make no attempt at building a nest, but deposit their one egg anywhere on the bare ground. The eggs were almost as thick as the clinkers on the coral beach.

ANOUS STOLIDUS, (*Linn.*) *Gray* [Nos. 67323, 67326].

Sterna stolida, LINN., Syst. Nat., i, 1766, 227.
Megalopterus stolidus, BP., List, 1838, 61.
Anous stolidus, GRAY, List Gen. of Birds, iii, 1841, 100.—COUES, Key N. A. Birds, 1872, 323; Birds Northwest, 1874, 710.
Anous niger, STEPH., Gen. Zoöl., xiii, 1826, 140.
Gavia leucocephs, SW., Classif. B., ii, 1837, 373.

Localities: Palmyra and Christmas Islands. Breeding in both localities. There was a marked difference in the habits of the birds of the two islands. On Palmyra, they build nests of twigs in the forks of the tallest trees; a few were observed to build nests in the cocoanut-trees at the bases of the leaves. On Christmas Island, where there are no trees, they lay their eggs on the bare ground within a circle of a few twigs.

GIGIS ALBA, (*Sparrm.*) *Bp.* [No. 67335].

Sterna alba, SPARRM., Mus. Carls., No. xi, 1786.
Sterna candida, GM., Syst. Nat., i, 1788, 607.
Gigis candida, WAGL., Isis, 1832, 1223.
Gigis alba, BP., Compt. Rend., 1856, 773.
Gigis nepoleonis, BP., Compt. Rend., 1856, 773.

Localities: Palmyra and Christmas Islands. These furnish us with

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PROCELLARIIDÆ.

ADAMASTOR CINEREUS, (*Gm.*) *Coues* [Nos. 67370, 67371].

Procellaria cinerea, GM., Syst. Nat., i, 1788, 563.
Puffinus cinereus, (GM.) LAWR., Birds N. A., 1858, 835.
Procellaria hæsitata, FORST., Descr. An., ed. Licht., 1844, 208.
Puffinus hæsitatus, LAWR., Ann. Lyc. Nat. Hist. N. Y., 1853, vi, 5.
Adamastor typus, BP., Consp. Av., ii, 1856, 187.
Procellaria adamastor, SCHLEGEL, Monog. *Proc.* Mus. Pays-Bas, 1863, 25.
Adamastor cinereus, COUES, Proc. Acad. Nat. Sci. Phila., 1864, 119 (critical).

Locality: off Cape Horn.

PUFFINUS (NECTRIS) NATIVITATIS, *Streets*, n. sp. [No. 67318].

Bill shorter than the head, much shorter than the tarsus; size medium; sides compressed, as wide as high at the base; unguis moderate, much hooked; commissure slightly curved from base to unguis, convexity downward; the lower margin of the rami of the inferior mandible straight; unguis concave and slightly deflexed. Nasal tubes about one-fourth of the length of the culmen, broad, depressed, obliquely truncated anteriorly; the nostrils oval; internal septum broad; culmen sloping downward abruptly from the upper part of the nasal tubes, and then rising very gradually toward the unguis. Commissural margins of the upper and lower mandibles inflected. The feathers on the front sweeping across the base of the bill with a gently-rounded outline, gaining the edge of the mandible about three-tenths of an inch from the angle of the mouth; feathers on the side of the lower mandible do not reach quite as far forward as those on the culmen. Wings of moderate length, and all the primaries graduated, the first the longest; tail rounded, containing twelve graduated feathers. Tarsus slender and compressed, equal in length to the middle toe without claw; outer toe without its claw longer than the middle without the appendage, but including claws the middle toe is the longest; the tip of the claw of the inner toe falling short of the base of the middle claw one-tenth of an inch.

The entire coloration of the species sooty-black, without any mixture of gray, except on the chin, where it is very faint; somewhat darker on the head and upper parts, where it is more of a brownish-black; on the under parts, it is of a rich chocolate hue. Bill black; tarsus and feet brownish-black, somewhat lighter on their inner aspects. Primaries and tail-feathers scarcely darker than the rest of the plumage; shafts brown on the upper surface, those of the primaries with a longi-

tudinal line of white on the under surface; the under surface of the shafts of the tail-feathers presents three longitudinal parallel lines of white, one central and two lateral, with broad brownish interspaces.

Total length 14.50 inches; length of bill along the culmen 1.20 inches; along the commissure 1.80; from the feathers on the side of the upper mandible 1.50; from the feathers on the side of the lower mandible 1.35; height of bill at base 0.40; width about the same; length of the nasal tubes 0.30; wings, from the carpus, 9.70; tail 4.20; tarsus 1.70; middle toe and claw 2.00; outer toe and claw 1.90; inner toe and claw 1.65; hallux 0.12.

Locality: Christmas Island. One specimen. Captured on its nest.

The determination of this species is based upon Dr. Elliott Coues's "Critical Review of the Family Procellariidæ". Regarding this monograph as the latest and most exhaustive survey of this very difficult family, we find but one species that could in any way be confounded with the one under consideration, and that is *Nectris fuliginosus* Keys et Blas, a much larger species, and one, moreover, that is confined to the Atlantic Ocean. These two species (*fuliginosus* and *nativitatis*) are the only ones of the subgenus *Nectris* whose plumages are dark fuliginous without any admixture of white.

Kuhl's *Procellaria fuliginosa*, sp. 12, p. 142, is recognized as the *Pterodroma atlantica* Bp. = *Æstrelata fuliginosa* Coues, which is an Atlantic species, and is not a true puffin; the *Procellaria fuliginosa*, sp. 27, p. 148, of the same author, is a *Puffinus*, and is now known as the *pacificus*. Its flesh-colored bill and feet, however, immediately separate it from *nativitatis*. Exactly what is the *Nectris fulginosa*, of Forster, no one seems to know. It is barely possible that it may be the species which we have just described as new; but there is no doubt that the latter is entirely distinct from all the other species which have been described by the old ornithologists under the name *fuliginosa*. If it be the one of which we have implied a doubt (this, however, cannot be proven), a re-description will not be amiss, and a re-naming will be demanded on account of the prior claim of another species to the same name.

ÆSTRELATA PARVIROSTRIS, (*Peale*) *Coues*. [Nos. 67317, 67331].

Procellaria parvirostris, PEALE, U. S. Expl. Exped., Orn., 1848, 298.
Rhantistes parvirostris, BP., Compt. Rend., 1856, 768.
Æstrelata parvirostris, COUES, Proc. Acad. Nat. Sci. Phila., 1866, 146 (critical).

Locality: Christmas Island. Breeding in January. They make their

nests on the ground under low bushes. They merely scoop a hole in the ground for the egg. The eggs are large, rotund-elliptical, with a smooth, white, and translucent shell. They are such close setters that nothing could induce them to leave their eggs voluntarily. When we removed them from their nests they instantly returned to their duty on being released.

DIOMEDEA CULMINATA, *Gould* [No. 67368].

Diomedea cholorhynchos, of AUDUBON'S Works.

Diomedea culminata, GOULD, Ann. & Mag. N. H., 1844, xiii, 361.—COUES, Proc. Acad. Nat. Sci. Phila., 1866, 183 (critical).

Locality: at sea, off Cape Horn.

DIOMEDEA NIGRIPES, *Aud.* [Nos. 67362, 67363, 67364, 67365].

Diomedea nigripes, AUD., Orn. Biog., v, 1839, 327.—COUES, Proc. Acad. Nat. Sci. Phila., 1866, 178 (critical).

Diomedea brachyura juv., CASSIN, Illust. B. Cal. & Tex., 1853, 291.

Diomedea gibbosa, GOULD, Ann. & Mag. N. H., 1844, xiii, 361.—COUES, Proc. Acad. Nat. Sci. Phila., 1866, 180.

Locality: North Pacific Ocean. Captured at sea while on the passage between Honolulu and San Francisco. The series is a good one to illustrate the species in nearly all its stages of plumage, and notably that described by Gould as *D. gibbosa*, which is nothing more than the adult plumage of *nigripes*. Dr. Coues, in his excellent "Critical Review of the Family Procellaridæ", alludes to this as the probable conclusion to be arrived at upon a more thorough investigation of the species. We have first presented to us the typical *nigripes*, with its uniformly dusky plumage. The white first makes its appearance on the basal portions of the upper and under tail-coverts; it increases in quantity until there is but a narrow rim of brown left at the apices of the feathers. In older specimens, the brown entirely disappears, and the whole of the crissum and upper coverts are pure white.. We then find the white traveling upward and spreading itself over the abdomen. In those specimens that have the greatest amount of white on the under surface of the body, we find a widening area of the same color on the top of the head, spreading backward from the narrow rim that originally surrounded the base of the bill.

ALCIDÆ.

BRACHYRHAMPHUS CRAVERI, (*Salvad.*) *Coues* [No. 70663].

Uria craveri, SALVAD., Descr. Alt. Nuov. Ucc. Mus. di Torino, 1867, 17.
Brachyrhamphus craveri, COUES, Proc. Acad. Nat. Sci. Phila., 1868, 66.

Locality: Isla Raza, Gulf of California. An adult female in full plumage, taken in April, 1875. It was breeding in holes in the rocks, amid the innumerable gathering of *Larus heermanni*, already noticed. Eggs *two*, taken from a crevice of a rock at arm's length. These eggs resemble those of the tern, though rather elliptical-ovoid in shape. They differ from each other decidedly in the ground-color as well as in the markings. The darkest one is brownish-drab, with nearly half of the surface (on the larger end) heavily and confluently blotched with reddish-brown and dark brown, with a few neutral-tint shell-markings interspersed; the rest of the egg is sparsely sprinkled with smaller and more distinct markings of the same color. The ground of the other egg is clay-colored, or very pale stone-gray, with markings of the same colors as before, but less heavy, more distinct, and smaller. There is the same aggregation of spots about the larger end, but not so fully carried out, and the rest of the surface is more thickly and uniformly flecked than the same portion is on the other egg. The darker egg measured 2.05 by 1.40; the other 1.95 by 1.35. The eggs of the species, as far as we are aware, have not before been described.

The specimen of the bird is interesting as coming from far up the gulf, from virtually the same locality as the original of *Uria craveri* is

come to hand thus far with the pure white lining of the wings were taken in winter, as far as known. Such an assumption would not be widely at variance with the known characters of the seasonal changes of plumage in some members of this family, but remains to be proven. Pending this determination, *craveri* should be recognized as a good species.

SPHENISCIDÆ.

SPHENISCUS HUMBOLDTI, *Meyen* [No. 67367].

Diomedea chilensis, MOLINA, Hist. Nat. Chili, 1786, 210.
Aptenodytes chilensis, GM., Syst. Nat., i, 1788, 559.
Aptenodytes molinæ, LATH., Ind. Orn., ii, 1790, 881.
Spheniscus humboldti, MEYEN, Nov. Act. Acad. Cæs. Leop. Carol., 1834, xvi, suppl. i, 110, pl. xxi.

Locality: harbor of Talcahuano, Concepcion Bay, Chili.

HERPETOLOGY.

HYLIDÆ.

HYLA REGILLA, *Baird & Girard* [No. 8572].

Hyla regilla, BAIRD & GIRARD, Proc. Acad. Nat. Sci., Phila., 1852, 174; 1853, 301.—BAIRD, P. R. R. Rep., x, 1859, Williamson & Abbott's Route, Reptiles, 12, pl. 28, f. 3.—GIRARD, Herp. U. S. Expl. Exped., 60, pl. 3, f. 13-18.—COOPER & SUCKLEY, Nat. Hist. Wash. Terr., 1860, 304.—COPE, Check-list, 1875, 30.

Hyla scapularis, HALLOWELL, Proc. Acad. Nat. Sci. Phila., 1852, 183; P. R. R. Rep. x, 1859, Williamson's Route, Reptiles, 21.

Locality: Cerros Island, off the Pacific coast of Lower California. Near a spring of fresh water on the southeastern side of the island. Ground-color green; a narrow, deep-brown band extending from the nostril to the anterior margin of the orbit; a broader band of the same color from the posterior border of the orbit to the shoulder; the latter band margined below by a narrow rim of orange about half the breadth of the brown vitta; the side of the body between the shoulder and thigh spotted with brown; a V-shaped spot of brown between the eyes; two bands of the same color, one on either side the dorsal region, extending from the occiput to the sacrum; an oblong spot on the middle of the sacrum. The extremities ornamented with transverse series of broad spots. The entire under surface of the body yellow.

Heretofore this frog has been strictly confined to the Pacific region, where it is quite common. This is the first notice we have of its living in the Lower Californian region. The most southern locality whence it has been obtained previous to this is Tejon Pass (Hallowell, *P. A. N. S. Phila.*, 1852) in the southern portion of Alta California.

GECCONIDÆ.

DIPLODACTYLUS UNCTUS, *Cope* [No. 8571].

Diplodactylus unctus, COPE, Proc. Acad. Nat. Sci. Phila., 1863, 102; Check-list, 1875, 50.

Locality: Triunfo, Lower California.

The only way in which this specimen differs from Cope's original

description is in the arrangement of the color on the back. Though the plan of arrangement is the same, yet, instead of the color being placed so as to form five continuous blackish cross-bands from the base of the tail to the interscapular region, the bands are more or less interrupted, thereby giving to the region somewhat of a marbled appearance.

IGUANIDÆ.

PHRYNOSOMA HERNANDEZI, Cope [No. 8567].

Phrynosoma hernandezi, COPE, Check-list, 1875, 48.

Tapaya hernandezi, GIRARD, Herp. U. S. Expl. Exped., 1858, 395.—BAIRD, P. R. R. Rep., x, 1859, Whipple's Route, Reptiles, 38; U. S. and Mex. Bound. Surv., ii, pt. ii, 1859, Reptiles, 8.

Locality: Sonora, Mexico. Found living on the low, sandy, desert-like plains along the gulf coast. One of these interesting little animals was kept as a pet on board the ship until it died. After its death, its body was preserved in alcohol. When the collection was being examined attentively, in view to the determination of the species, the throat, mouth, and nostrils of this one were found to be completely clogged up with parasites, small round worms, from a half to three-quarters of an inch long. Its diet while in captivity consisted exclusively of flies and cockroaches, and it is highly probable that from the one or the other of these insects originated the parasites. The latter are now in the hands of an eminent helminthologist for determination.

swiftness to their burrows, which are generally in the midst of a dense clump of bushes, or under rocks. When once in their holes, so tenaciously do they hold on with their stout claws that the strength of a single person is not sufficient to drag them out. Their bleached remains scattered about over the island attest that they fall easy victims to the birds of prey.

Excretæ, supposed to be of this Lizard, deposited in the National Museum at Washington, and collected from the high lands of Utah and New Mexico by Dr. Yarrow, of Wheeler's Geographical and Geological Survey, bear no resemblance to what was seen common around the mouths of their burrows on Angel Island. In the first place, the excrement was not deposited in masses, but was scattered about. The scybalæ were oblong, and seemingly composed of the shells of seeds and other indigestible matter of plants. They were dry and porous, and so loosely held together that they could be readily pulverized under the foot.

UTA STANSBURIANA, *Baird & Girard* [Nos. 8570, 8569].

Uta stansburiana, BAIRD & GIRARD, Proc. Acad. Nat. Sci. Phila., 1852, 69; Stansbury's Rep. Exped. Great Salt Lake, 345, pl. 5, f. 4-5.—BAIRD, U. S. & Mex. Bound. Surv., ii, pt. ii, 1859, Reptiles, 7; P. R. R. Rep., x, 1859, Whipple's Route, Reptiles, 37.—COPE, Check-list, 1875, 48.—YARROW, Wheeler's Geogr. and Geolo. Expl. and Surv. West of the 100th Merid., v, 1875, Zoöl., 568.—COUES, op. cit., v, 1875, Zoöl., 596.

Locality: Cerros Island, off the Pacific coast of the peninsula of Lower California, and also from the mainland. The color of the male is brown above, with whitish-yellow irregular dots. The double row of dorsal patches of a deeper black, which is sometimes observed in this species, is more or less confluent into four longitudinal lines in our specimen. The female is uniformly pale olive above. Both sexes are yellowish below, greenish along the sides, and bluish under the throat There is also present in both sexes a deep indigo spot on the sides, just posterior to the axilla.

CHIROTIDÆ.

CHIROTES CANALICULATUS, *Cuvier* [No. 8568].

Le Canellé, LACÉP., Hist. Quad. Ovip., i, 613, pl. 41.

Le Binane canellé, CUV., Règne Anim., (1re édit.) ii, 57; (2re édit.) ii, 67.

Bipes canaliculatus, BONNAT., Encyclop. Erp., 68, pl. 12, f. 6.—LATR., Hist. Nat. Rept. ii, 90.

Lacerta lumbricoides, SHAW, Nat. Misc., vi; Gener. Zoöl., iii, 311.
Lacerta mexicana, DONND., Zoöl. Beit., iii, 135.
Lacerta sulcata, SUCKOW, Thier., iii, 147.
Chalcides propus, DAUD., Hist. Rept., iv, 372, pl. 58, f. 4.
Chamæsaura propus, SCHNEID., Hist. Amphib., ii, 211.
Bimanus propus, OPPEL., Die Ordnung. Famil. und Gattung. Rept., 46.
Chirote mexicain, BORY DE SAINT VINCENT, Résumé d'Erpet., 141, pl. 27, f. 1.
Chirotes lumbricoides, FLEM., Ph. Zoöl., ii, 278.—EICHW., Zoöl. Spec. Ross. Polon., iii, 180.—JAMES, LONG'S Exped. to the Rocky Mts., i, 484.—HARLAN, Jour. Acad. Nat. Sci. Phila., vi, 55.—GRAY, Cat. Tort., 1844, 74; Cat. Shield Rept., pt. ii, 34.
Chirotes canaliculatus, DUM., Collect. Mus. Par.—MERREM., Tent., 181.—FITZ., Neue Classif. Rept., 53.—GUÉR., Icon. Règne Anim. Cuv. Rept., pl. 16, f. 3.—SCHINZ, Naturg. und Abbild. Rept., 107, pl. 41, f. 2.—DUM. & BIB., Hist. des Rept., v, 1839, 474.—GRAY, P. Z. Soc., 1865, 446.

Locality: La Paz, Lower California. Obtained through the agency of the United States consul at La Paz. The Mexican name for this reptile is *ajolote*, which, however, cannot be considered as specific or even generic, as it is applied to several species of *Amphisbænidæ*. I was informed that it lives mostly underground, coming out only at night. Its rudimentary eyes and the arrangement and shape of the feet, which are similar to those of the mole, would suggest subterrestrial habits, as would also the absence of coloring matter in its integument. The specimen obtained in Lower California differs in no respect from the description given in Duméril and Bibron's "Histoire des Reptiles". Reference to the above biographical notice will show that it has been extensively quoted as coming from Mexico, which so far has been regarded as its only habitat. The only assurance we have of its ever having been found within the limits of the United States rests upon the somewhat doubtful statement in "Long's Expedition to the Rocky Mountains". The testimony is as follows:—"We observed, in repeated instances, several individuals of a singular genus of Reptiles (*Chirotes*, Cuv.), which in form resemble short Serpents, but are more closely allied to the Lizards by being furnished with two feet. They were so active that it was not without some difficulty that we succeeded in obtaining a specimen. Of this (as was our uniform custom when any apparently new animal was presented) we immediately drew out a description. But as the specimen was unfortunately lost, and the description formed part of the zoölogical notes and observations, which were carried off by our deserters, we are reduced to the necessity of merely indicating the probability of the existence of the *Chirotes lumbricoides* of naturalists within the territory of

the United States."—(Vol. i, p. 484.) As no mention is made as to whether the two feet observed were the anterior or posterior pair, it is possible that the animal here noticed might have been one of the *Scincidæ*, which are also characterized by only one pair of feet, which are the posterior, however, instead of the anterior, as in *Chirotes*. Professor Cope does not include it in his "Check-list of North American Batrachia and Reptilia", which embraces the reptilian fauna of Lower California.

CROTALIDÆ.

CROTALUS PYRRHUS, *Cope* [No. 8562].

Crotalus pyrrhus, COPE, Check-list, 1875, 33.

Caudisona pyrrha, COPE, Proc. Acad. Nat. Sci. Phila., 1866, 308, 310—COUES, Wheeler's Geographical and Geological Explorations and Surveys West of the 100th Meridian, vol. v, 1875, Zoölogy, 608, pl. xxii.

Locality: Angel Island, Gulf of California. This is the first notice of the occurrence of this rare and interesting rattlesnake since the date of its original description by Professor Cope, in 1866, and, as far as I am able to discover, it is the second specimen in existence in any museum.* It is readily distinguishable from all other members of the family, except *C. mitchelli*, by the presence of scales between the prenasals and the rostral; and from the latter by the greater subdivision of the plates of the head—*C. mitchelli* having but one loreal, whilst in *pyrrhus* there are four.

The general style of coloration is much the same as given in the description and plate (Wheeler's Report), except that the colors in the recent specimen have somewhat faded in alcohol. The ground-color is a pinkish-gray instead of a salmon color. An exact tint, however, cannot be a point of much specific importance in reptiles, as they are known to be susceptible of a certain range of variation in their colors, in order to harmonize with the color of the ground on which they happen to be lying. The markings along the back are reddish-bay. These markings consist of a dorsal row of large hexagonal spots and a lateral row of smaller spots opposite the dorsal patches. On the anterior third of the length of the body, the hexagons are small and regular in outline, and are separated from the lateral spots by a well-defined interspace; on the middle third, they become more transverse, the lateral angles con-

* Since the above was written, the head of a third specimen has been found in the reserve series of the National Museum.

lescing with the row on the sides; and, on the posterior third of the length, all the markings have run together completely, being transformed into regular transverse bands. Three black half-rings on the tail. Some of the scales of the rows surrounding the dorsal patches are black-tipped. There is a heightening of the ground-color on the sides in the intervals between the lateral spots, corresponding to what Professor Cope describes as vermilion-colored spots. The bright lemon-colored spots in the same region have disappeared. The total length of the snake is 3½ feet.

CROTALUS ADAMANTEUS ATROX, *Cope* [No. 8564].

Crotalus adamanteus atrox, COPE, Check-list, 1875, 33.

Crotalus atrox, BD. & GIR., Cat. N. Amer. Rept., 1853, 5, 156.—BD., P. R. R. Rep., x, 1859, Whipple's Route, Reptiles, 39, pl. 24, f. 3; U. S. and Mex. Bound. Surv, ii, pt. ii, 1859, Reptiles, 14, pl. i.

Caudisoma atrox, COPE, Mitchell's Res., 1861, 121; Proc. Acad. Nat. Sci. Phila., 1865, 309.

Caudisoma adomantea atrox, COUES, Wheeler's Geographical and Geological Explorations and Surveys West of the 100th Meridian, vol. v, Zoölogy, 1875, 607.

Locality: Los Coronados Islands, Pacific coast of Lower California.

ELAPIDÆ.

ELAPS EURYXANTHUS, *Kennicott* [No. 8566.]

Elaps euryxanthus, KENNICOTT, Proc. Acad. Nat. Sci. Phila., 1860. 337.—COPE, Proc. Acad. Nat. Sci. Phila., 1866, 307; Check-list, 1875, 34.—COUES, Wheeler's Geographical and Geological Explorations and Surveys West of the 100th Meridian, vol.

[redacted]

Pityophis bellona, Bd. & Gir., Cat. N. Amer. Rept., 1853, 66, 157.—Kenn., *apud* Bd., P. R. R. Rep., x, 1859, Williamson's Route, Reptiles, 42.—Bd., P. R. R. Rep., x, 1859, Beckwith's Route, Reptiles, 19.—Kenn., *apud* Bd., U. S. & Mex. Bound. Surv., ii, pt. ii, 1859, Reptiles, 19.—Cope, Proc. Acad. Nat. Sci. Phila., 1866, 305.—Allen, Proc. Boston Soc. Nat. Hist., xvii, 1874, 69.

Locality: Saint Martin's Island, Pacific coast of Lower California. In our specimen, there is but one anterior orbital on a side; postorbitals three. On the left side, there are two prefrontals; the adventitious one is quite small, and is situated at the inner edge of the larger and normal prefrontal plate of the same side, between the rostral and the left internal postfrontal. Nine superior labials on each side, the eye resting on the fifth. In those cases where there are but eight labials on a side, the eye always rests on the fourth, and invariably on the fifth when nine plates are present. The additional plate is inserted anterior to the position of the eye; and in those cases the head is more elongate.

The whole of this small collection of reptiles, with two exceptions, came from the outlying islands along the coasts of the peninsula of Lower California. They can be arranged into two groups, representing, one the Pacific, and the other the gulf islands, accordingly as they are related to the two regions north of them; namely, the Pacific and Sonoran:

I. Types purely Sonoran, including all those that came from the gulf region:

Phrynosoma hernandezi.
Sauromalus ater.
Crotalus pyrrhus.
Elaps euryxanthus.

II. Types purely Pacific, or species belonging as well to the Pacific as to the Sonoran region, including all those that came from the Pacific coast:

Hyla regilla.
Uta stansburiana.
Crotalus adamanteus atrox.
Pityophis sayi bellona.

I desire especially to direct attention to the occurrence on Angel Island of two highly characteristic Arizonian reptiles, the *Sauromalus ater* and *Crotalus pyrrhus*. These have heretofore been confined to Arizona, and they are by no means common there. The naturalists of Wheeler's Survey have explored the Southwestern Territories for three successive

seasons, and have failed to add a single specimen of either to their collections. Their presence on Angel Island, which is situated in the gulf about midway its length, may be readily explained when we consider the geological changes that have taken place since the post-tertiary period. The study of the geological formation of all the outlying islands of the peninsula, both in the gulf and on the Pacific coast, convinced me that they were at one time portions of the mainland; the study of their fauna strengthens this conclusion. Fringing the mainland, and overlying the other formations on the islands, is a deposit of post-tertiary origin. There was an extensive upheaval during that period, and then it was that the islands probably formed a part of the peninsula, subsidence taking place subsequently. So far has this depression gone on—and it is probably going on at present—that some of the islands are now separated from the mainland by water a thousand feet deep. If we carry ourselves back to the time when they formed a part of the mainland, we will have the mouth of the Colorado River discharging its water into the gulf somewhere about the present site of Angel Island. So that it is not difficult to account for the presence of these reptiles on this now isolated bit of land, which was then connected with the Arizonian region by a continuity of surface.

ICHTHYOLOGY.

I.—*Fishes of Upper and Lower California.*

DIODONTIDÆ.

DIODON MACULATUS, *Lacép.* [No. 17540].

Diodon tacheté, LACÉP., Poiss., ii, 1801, p. 13.

Diodon novemmaculatus, CUV., Mém. Mus. Hist. Nat., iv, 1818, 136, pl. 6.—BLEEK., Nat. Tyds. Ned. Ind., iii, 1852, 567.

Diodon sexmaculatus, CUV., op. cit., iv, 1818, 136, pl. 7.—KAUP, Arch. Naturgesch., xxi, i, 1855, 229.

Diodon multimaculatus, CUV., op. cit., iv, 1818, 136, pl. .—KAUP, op. cit., xxi, i, 1855, 227.

Diodon quadrimaculatus, CUV., op. cit., iv, 1818, 137, pl. 6.—BLEEK., Act. Soc. Sc. Indo-Neerl., ii, Amboina, viii, 94.

Diodon spinosissimus, KAUP, Arch. Naturgesch., xxi, i, 1855, 228 (not Cuvier).

Paradiodon novemmaculatus, BLEEK., Atl. Ichth., v, 1865, 57, pl. 206; *Gymnod.*, pl. 2, f. 3.

Paradiodon quadrimaculatus, BLEEK., Atl. Ichth., v, 1865, 58, pl. 212; *Gymnod.*, pl. 8, f. 2.

Diodon maculatus, GTHR., Cat. Fishes, viii, 1870, 307.

Locality: Lower California.

Our species corresponds to var. *a* of Günther. It presents some points of difference, which we will note. The frontal row of spines the longest; nearly all the spines of the back and sides are longer than the diameter of the eye. The black band between the eyes does not extend completely across the interorbital space, but is interrupted in the center; it extends downward behind the eyes. The color is distributed over the rest of the body as follows:—A vertical band beneath the eye; a broad band across the nape of the neck; a large round spot on either side above and behind the base of the pectoral fin; a large triangular spot, with apex truncated, in the middle of the back; a V-shaped spot more posteriorly, diverging anteriorly, and with the base of the dorsal fin situated in the angle. Besides these, there are a number of small round spots scattered over the back and sides, one of which, larger than the rest, on the side, is situated behind and on a line with the inferior edge of the pectoral fin.

Length, 6 inches.

COTTIDÆ.

LEPTOCOTTUS ARMATUS, *Gir.* [No. 12963].

Leptocottus armatus, GIRARD, Proc. Acad. Nat. Sci. Phila., vii, 1854, 131-145; viii, 1856, 133; P. R. R. Report, x, 1858, Fishes, 60, pl. 15, f. 2.

Acanthocottus inermis, AYRES.

Centridermichthys armatus, GÜNTHER, Cat. Fishes, ii, 1860, 171.

Locality: Mare Island, Cal.

Günther queries Girard's statement that the end of the upper maxillary bone extends beyond the vertical from the posterior margin of the orbit. In our six specimens from Mare Island, varying in length from 3.50 to 5 inches, it reaches in every example either to or beyond the vertical from the posterior margin of the orbit. We find nothing wanting to complete Girard's excellent description of this fish.

SCORPÆNIDÆ.

SEBASTOMUS AURICULATUS, (*Gir.*) *Gill* [No. 12964].

Sebastes auriculatus, GIRARD, Proc. Acad. Nat. Sci. Phila., 1854, 131; P. R. R. Report x, 1858, Fishes, p. 80.—AYRES, Proc. Cal. Acad. Nat. Sci., ii, 1853, 218, f. 68; Proc. Zoöl. Soc. London, 1863, 394, fig.

Sebastes ruber, var. *parvus*, AYRES, Proc. Cal. Acad. Nat. Sci., i, 1854, 7.

Sebastichthys auriculatus, GILL, Proc. Acad. Nat. Sci. Phila., 1862, 278.

Sebastomus auriculatus, GILL, MSS.

Locality: San Francisco, Cal. Caught at the wharves of Mission

an abnormal number); posterior canine present in the upper jaw. The superior maxillary does not reach to the vertical from the anterior margin of the orbit. Caudal fin deeply concave behind, angles produced. The anterior portion of the body from behind the gill-opening to a line drawn vertically from the commencement of the soft dorsal to the anal fin reddish (in alcohol); posteriorly blackish-brown; head blackish-brown, except lower jaw and chin, which are reddish-white. (Ayres states the chin to be white in life.) The color on the chin extends backward to a line drawn obliquely downward from the angle of the mouth. A light-colored vertical band on the posterior margin of the caudal; posterior extremities of soft dorsal and anal lighter colored.

Total length, 27 inches; height of the body at its greatest elevation, 7 inches.

EMBIOTOCIDÆ.

CYMATOGASTER AGGREGATUS, *Gib.* [No. 12966].

Micrometrus aggregatus, GIBBONS, Proc. Acad. Nat. Sci. Phila., vii, 1854, 125.—A. AGASSIZ, Proc. Boston Soc. Nat. Hist., 1861, 128.

Cymatogaster aggregatus, GIBBONS, Proc. Acad. Nat. Sci. Phila., vii, 1854, 106.—GILL, Proc. Acad. Nat. Sci. Phila., 1862, p. 275 (foot-note).

Holconotus rhodoterus, GIRARD, Proc. Acad. Nat. Sci. Phila., vii, 1854, 141, 152; 1855, 322; P. R. R. Report, x, 1858, 193, pls. 35 and 36, figs. 1-4; pl. 26, f. 7 and 8.—SUCKLEY, Nat. Hist. Wash. Terr., 1860, 358 (nec Agass.).

Metrogaster aggregatus, A. AGASSIZ, Proc. Boston Soc. Nat. Hist., 1861, 133.

Ditrema aggregatum, GÜNTHER, Cat. Fishes, iv, 1862, 248.

Locality: Mission Bay, San Francisco, Cal.

In Günther's Catalogue of Fishes, Vol. iv, p. 248, we find the following foot-note in reference to Girard's figure: "If the figure of pl. 36 has really been drawn from a specimen of this species, the control over the artist must have been very careless, the scales being represented much too small." The eminent authority whom we have just quoted evidently had the upper figure of the plate, *Amphistichus similis*, in which the scales are correctly represented small, in his mind's eye when he charged the American ichthyologist with being careless; otherwise, we cannot see how he made the mistake which he did. We can certify by actual measurements that the scales of *Holconotus rhodoterus*, the fish in question, are sufficiently accurately represented in figure 1, plate 36, and are of the same size as those of the figures on the preceding plate, concerning which the gentleman is silent, leaving us to infer that they are correct in that respect.

TRICHIURIDÆ.

TRICHIURUS LEPTURUS, *Linn.* [No. 17545].

Trichiurus lepturus, LINN., Syst. Nat., i, 1766, 429.—BL. SCHN., Syst. Ichth., 1801, 517.—CUV. & VAL., Hist. Nat. des Poiss., viii, 1831, 237.—YARRELL, British Fishes, i, 1841, 204.—STORER, Boston Jour. Nat. Hist. iv, 1844, 181.—CASTELN. Anim. nouv. ou rares Amer. Sud, 1855, 24.—DEKAY, Zoöl. New York, Fishes, 1842, 109, pl. 12, f. 35.—GUICHEN, Poiss. in ROMON DE LA SAGRA, Hist. Cuba, 1845, 105.—GÜNTHER, Cat. Fishes, ii, 1860, 346.

Trichiurus argenteus, SHAW, Zoöl., iv, 1803, 90, pl. 12.—MITCH., Trans. Lit. and Phil., Soc., New York, i, 1815, 364.

Lepturus argenteus, GILL, Proc. Acad. Nat. Sci., Phila., 1863, 226.

The height of the body, at the situation of the pectoral fin, is contained $17\frac{1}{2}$ in the total length, and the length of the head is 7 times in the same. The eye occupies half of the depth of the head; its diameter is slightly more than the interorbital space, and it is contained 6 times in the length of the head and $1\frac{4}{9}$ times in the length of the snout. The latter is $3\frac{1}{3}$ times in the head-length. Height of pectoral fin is $\frac{2}{3}$ of the height of the body, and is contained $26\frac{1}{4}$ times in total length; tail, from the extremity of the dorsal fin, $5\frac{5}{6}$ in the same, and from the last spine on the lower surface of the body, $10\frac{1}{2}$ times. Anus placed at the junction of the anterior and middle thirds of the length; behind anus are 98 small spines. Dorsal rays, 122; pectoral, 11. Lateral line below the middle of the body. Silvery, with a dark metallic luster along the back. Length, 10.50.

[redacted]

those from the Atlantic be accepted as belonging to one species—*lepturus*—we find there to be a considerable variation in their proportions. We subjoin tables to illustrate this variation, as well as to show the affinities of the species from the Gulf of California with those found in the Gulf of Mexico, and also the relations of *haumela* with specimens from the Caribbean Sea. The specimens of *haumela* from which the measurements were taken came from the Indian Ocean, through the British Museum. The proportions from Cuvier and Valenciennes are taken as the standard for comparison.

	Lepturus.		
	C. & V.	New York.	Cuba.
Height in total	16–17	$16\frac{2}{11}$	$16\frac{2}{3}$
Head in total	8	$8\frac{1}{4}$	$8\frac{1}{3}$
Snout in head	$2\frac{2}{3}$	3	—3
Eye in head	6	6	$6\frac{1}{4}$
Eye in snout	$2\frac{1}{4}$	2	$2\frac{1}{3}$
Tail in total	7	7	6

	Lepturus.			
	Lower California.	Texas.	Florida.	Mississippi.
Height in total	$17\frac{1}{2}$	$17\frac{2}{3}$	$17\frac{3}{8}$	$17\frac{1}{2}$
Head in total	7	$7\frac{1}{2}$	$7\frac{5}{9}$	—8
Snout in head	$3\frac{1}{3}$	+3	—3	—3
Eye in head	6	$5\frac{5}{7}$	$5\frac{5}{6}$	$5\frac{5}{6}$
Eye in snout	$1\frac{4}{9}$	$1\frac{6}{7}$	2	2
Tail in total	$5\frac{5}{6}$	6	6	$6\frac{9}{10}$

	Haumela.	Lepturus.	
	Indian Ocean.	Graytown, Nicaragua.	Graytown, Nicaragua.
Height in total	$15\frac{5}{9}$	$15\frac{1}{7}$	15
Head in total	7	$7\frac{2}{3}$	$6\frac{4}{7}$
Snout in head	$3\frac{1}{3}$	+3	—3
Eye in head	$6\frac{2}{3}$	$6\frac{5}{6}$	7
Eye in snout	2	$2\frac{1}{3}$	$2\frac{2}{3}$
Tail in total	7	$9\frac{2}{11}$	$8\frac{1}{2}$

LATILIDÆ.

CAULOLATILUS ANOMALUS, (*Cooper*) *Gill* [No. 17553].

Dekaya anomala, COOPER, Proc. Calif. Acad. Nat. Sci., iii, 1864, 70, f. 17.
Caulolatilus anomalus, GILL, Proc. Acad. Nat. Sci. Phila., 1865, 68.

D. $\frac{9}{25}$. A. $\frac{2}{24}$.

Greatest height of the body is contained $4\frac{1}{9}$ times in the total length, and the length of the head $4\frac{5}{9}$ in the same. The diameter of the eye is one-fifth of the length of the head, and the length of the snout one-third. The dorsal fin commences above the root of the pectoral, and extends to within a short distance of the caudal fin; its length is slightly more than one-half the total length; first dorsal spine the shortest—one-nineteenth of the total length of the fin; the longest spine between one-seventh and one-eighth; the longest soft ray between one-fifth and one-sixth; and the last ray about one-fifteenth of the length of the fin. The anal fin commences under the fourth soft dorsal ray, and terminates opposite the end of the dorsal; its length three-fifths of the length of the dorsal; its height one-fourth of its length. Pectoral long and pointed, somewhat shorter than the head; the middle ray the longest. Ventrals commence under the hinder margin of the base of the pectoral, and are contained $1\frac{2}{5}$ times in the length of the latter. Caudal peduncle is $12\frac{1}{3}$ times in the total length; its height about one-fourth of the greatest height of the body. Caudal fin about $6\frac{1}{2}$ times in the total length. Total length 18.50 inches.

Locality: Lower California.

are completely covered with scales. Our two specimens measure 25 and 26 inches in length.

Locality: Gulf of California, off the San Ignacio River, Sonora. We found them very abundant at this locality.

PRISTIPOMATIDÆ.

HÆMULON FLAVIGUTTATUM, *Gill* [No. 17543].

Hæmulon flariguttatus, GILL, Proc. Acad. Nat. Sci. Phila., 1862, 254.—STEINDACHNER, Sitzb. Akad. d. Wiss., lxxii, 1875, Ichthyologische Beiträge, iii, 14.

Hæmulon margaritiferum, GÜNTHER, Trans. Zoöl. Soc. London, vi, 1869, 419, pl. 65, f. 2.

D. $12\frac{1}{13}$. A. $\frac{3}{10}$. L. lat. 53 to the caudal fin; 61 to its termination on the caudal fin. L. trans. $\frac{8}{13}$.

The measurements of our specimen agree with Professor Gill's, except in the lengths of the eleventh, twelfth, and thirteenth dorsal spines, which are subequal and shorter than the second spine. Total length 12 inches.

Locality: Lower California.

XENICHTHYS CALIFORNIENSIS, *Stein.* [No. 17541].

Xenichthys californiensis, STEINDACHNER, Sitzsber. Ak. Wiss. Munich, lxxii, 1875. Ichthyologische Beiträge, iii, p. 3.

We arrive at a positive identity of our species by comparison with Dr. Steindachner's excellent description. We may add, however, that the longitudinal bands above the lateral line are much more distinctly defined and of a darker color than those below. The upper are blackish-brown, and there are some irregular markings between them. There are always three bands above the lateral line; while those below may vary from four to five. The whole surface of the body, except the under parts, is covered with minute brown points.

Locality: Cerros Island, Pacific coast of Lower California.

PRISTIPOMA LEUCISCUS, *Gthr.* [No. 17539].

Pristipoma leuciscus, GÜNTHER, Proc. Zoöl. Soc., 1864, 147; Trans. Zoöl. Soc., vi, 1869, 416, pl. 56. f. 3.

D. $11\frac{1}{14-16}$. A. $\frac{3}{8}$. L. lat. 51. L. trans. $\frac{5}{10}$.

Darker above the lateral line than below. A black spot posteriorly in the axil of the pectoral fin. A dark longitudinal line, rather indistinct, corresponding to the center of each row of scales on the sides. The fins, and the scales on the sides and breast, dotted with minute points of

black. We add these notes in regard to the color, for the reason that they are not mentioned in Günther's description, although they are represented in his figure.

Length of specimens 9.8 and 6.5 inches.

Locality: Lower California.

CONODON PLUMIERI, (*Bloch*) *Gthr.* [No. 17546].

Sciæna plumieri, BLOCH, Naturg. der ausländ. Fische, vi, 1785, 66, pl. 306.

Sciæna coro, BLOCH, Naturg. der ausländ. Fische, 1785, pl. 307, f. 2.—BLOCH, Syst. Ichth. ed. SCHN., 1801, 81.

Perca plumieri, BLOCH, Syst. Ichth. ed. SCHN., 1801, 85.—CUV. & VAL., Hist. Nat. des Poiss., ii., 1828, 57.

Centropomus plumieri, LACÉP., Hist. des Poiss., iv, 1803, 268.

Chilodipterus chrysopterus, LACÉP., op. cit., iii. 1803, 542, pl. 33, f. 1.

Conodon antillanus, CUV. & VAL., op. cit., v, 1830, 156.

Pristipoma coro, CUV. & VAL., op. cit., 1830, v, 266.—CUV., Règne Anim. Ill. Poiss., 1829–30, pl. 30, f. 2.—GÜNTHER, Cat. Fishes, i, 1859, 297.

Conodon plumieri, GÜNTHER, Cat. Fishes, i, 1859, 304.—TROSCHEL, In MÜLLER, Wirbelth. Mex., 91.

The height of the body is one-fourth of the total length, and the length of the head is contained $3\frac{2}{3}$ times in the same. The diameter of the eye is exactly one-fourth of the length of the head; the snout is somewhat longer. The lower jaw projecting in advance of the upper; the extremity of the upper maxillary bone extending slightly beyond the vertical from the anterior margin of the orbit. An external row of short, stout, conical teeth, the four or six anterior in each jaw larger and longer than

All the specimens obtained gave the following formula:

D. $11\frac{1}{12}$. A. $\frac{3}{7}$. L. lat. 50–51. L. trans. $\frac{6}{12}$.

Body silvery, darker above the lateral line, sides with eight vertical bars of dark brown descending from the dorsum to about the middle of the height of the body. The first descends from the nape of the neck; three begin along the base of the spinous dorsal; two from the soft dorsal; and two on the caudal peduncle.

We cannot distinguish this fish from the *Pristipoma coro* and *Conodon antillanus* of Cuvier and Valenciennes. It agrees with them in every essential particular. It will be observed, however, that the above description differs from Günther's in the following particulars:—The height of the body is one-fourth of the total length, instead of being contained in it $3\frac{1}{2}$ times; the posterior limb of the præoperculum is slightly concave, instead of descending obliquely backward; and, finally, there is but one strong spinous projection at the angle, instead of two. Cuvier in none of his descriptions mentions more than one strong spinous tooth at the angle.

Lengths 8, 7.25, 6.80 inches.

Locality: Boca Solidad, Pacific coast of Lower California.

SERRANIDÆ.

EPINEPHELUS ROSACEUS, *Streets*, n. sp. [No. 17554].

D. $\frac{11}{17}$. A. $\frac{3}{11}$. P. 16. V. $\frac{1}{5}$.

Height of the body somewhat less than the length of the head, and about $3\frac{2}{3}$ times in the total length, including the caudal fin; without caudal, three times. Length of the head is contained about $3\frac{1}{6}$ times in the total length, including caudal, and $2\frac{2}{3}$ without caudal. Dorsal outline arched, and the front descends in a nearly straight line from the commencement of the dorsal fin to the point of the snout. The length of the snout more than twice the diameter of the eye; and the latter is contained seven times in the length of the head. The interorbital space convex, and much broader than the diameter of the eye. Cleft of the mouth slightly oblique; lower jaw projecting; the end of the upper maxillary reaches to the vertical from the middle of the eye. Two or three large canine teeth in each jaw anteriorly, those in the lower jaw slightly smaller; an external lateral row of canines in each jaw. On the sides an internal series of movable teeth; on the lower jaw in front

there is a short villiform band between the canines and movable te on the upper jaw the movable teeth are intermediate between the ca and villiform band. Teeth on the vomer and palatines; on the named forming a triangular band. The præoperculum slightly not above the angle; the posterior margin and angle finely serrated inferior border as well as the free margins of the sub- and inter culum smooth. The membranous border of the operculum prod behind the spines to an acute point; the middle of the three spine largest, and placed nearer the lower than the upper spine of the bo The dorsal fin commences directly above the base of the pectoral; third and fourth spines are the longest, but shorter than the post rays of the soft dorsal; first spine about one-half the length of the ond. Spinous portion of the fin lower than the soft; the posterior of the latter the longest. Anal commences about under the sixth dorsal ray, and ends before the termination of the dorsal; the first s very short, the second more than one-half the length of the third; anterior rays prolonged, the fifth and sixth the longest; the post border emarginate. Pectorals rounded posteriorly, about one-hal length of the head, a large fleshy flap in the superior axil. Ven somewhat shorter than the pectorals, and commence just behind base, and do not extend to the vent. Caudal slightly emarginate, constitutes about one-fifth of the total length of the body.

Color (in life) uniformly rosaceous; (in alcohol) golden-yellow.

Total length, 20.50 inches; height, 5.50; head, 6.50.

Locality: Gulf of California, in the vicinity of Angel Island.

and the stout spines from the angle extend further along on this border than up the posterior, and the gradation is less abrupt; nine series of scales between the eye and the angle of the præoperculum. The end of the upper maxillary reaches nearly or quite to the vertical from the posterior margin of the orbit. Dorsal fin with a notch; the ninth spine being exactly the same length as the tenth.

The colors on the side of the body have somewhat the same arrangement as is observed in *C. radians*. There are eight transverse streaks between the angle of the operculum and the base of the caudal fin, and these are crossed along their middle by a longitudinal band. All these markings are more or less indistinct. An irregular black blotch at the base of the caudal fin. Soft dorsal and caudal spotted. Ground color yellowish.

Total length, 9.50 inches; length of the head contained 3½ times in the total length; the greatest height of the body is a little more than one-quarter of the total length.

Locality: Bay of La Paz, Lower California.

The only characters that are peculiar to the species described by Günther are the six rows of scales between the eye and the angle of the præoperculum, and the longer tenth spine of the spinous dorsal. These are of extremely doubtful importance to found a new species upon, inasmuch as the species is recognized as subject to local or individual variation.

ECHENEIDIDÆ.

ECHENEIS REMORA, LINN. [No. 17547].

Echeneis remora, LINN., Syst. Nat., i, 1766, 446; Amœn. Acad., i, 1749, 320, and Mus. Reg. Ad. Fred., i, 1754, 75.—OSBECK, Voy. China, 1771, 94.—SCHŒPFT, Schrift. Gesellsch. Naturg. Freunde, Berlin, viii, 3, 145.—BL., Naturg. der ausländ. Fische, ii, 1785, 134, pl. 172.—BL., Syst. Ichth., ed. SCHN., 1801, 240.—LACÉP., Hist. des. Poiss., iii, 1803, 146, 147, pl. 9, f. 1.—CUV., Règne Anim., 1817.—BLUMENB., Abbild., 1810, pl. 78.—RISSO, Ichth., Nice, 1810, 177; Eur. Merid., iii, 1827, 269.—SHAW, Zoöl., iv, 1803, 202, pl. 31.—MÜLLER, Prodr. Faun. Dan., 1777, no. 361.—MITCH., Trans. Lit. & Phil. Soc. New York, i, 1815, 378.—TURTON, Brit. Faun., 94.—RICHARDS, Faun. Bor. Amer., 1836, 265.—FABER, Fische Islands, 115.—SCHLEG., Faun. Japon. Poiss., 1850, 271.—DEKAY, Zoöl., New York, Fishes, 1842, 309.—LOWE, Trans. Zoöl. Soc. London, iii, 16.—BENN., Whaling Voy., 271.—JENYNS, Zoöl., Beagle, Fishes, 1842, 142.—YARRELL, Brit. Fishes, i, 3d edit., 1859, 670.—GÜNTH., Ann. & Mag. Nat. Hist., 1860, 390; Cat. Fishes, ii, 1860, 378; Jour. Mus. Godeff. Heft., xi, 1876, Fische der Sudsee, Heft., v, 156.—GILL, Proc. Acad. Nat. Sci. Phila., 1864, 60.

Echeneis naucrates, RISSO., Eur. Merid., iii, 1827, 270.

Echeneis Jacobœa, LOWE, Proc. Zoöl. Soc. London, 1839, p. 89; Trans. Zoöl. Soc. L don, iii, 17.

Echeneis pallida, LOWE, op. cit., 1839, 89; op. cit., iii, 16, (nec Schleg.).

Echeneis romoroides, BLEEK., Nat. Tyds. Ned. Ind., ii, 1855, Batœ, 70.

Echeneis parva, GRONOV., (1780), Syst. ed., Gray, 1854, p. 92.

Remora Jacobœa, GILL, Proc. Acad. Nat. Sci., Phila., 1862, 240; 1863, 88.

Locality: Bay of La Paz, Lower California.

This, along with the following species, was found on the body o large sea-devil (*Ceratoptera*), caught in the Gulf of California.

ECHENEIS ALBESCENS, *Schleg.* [No. 17544.]

Echeneis albescens, SCHLEG. Faun. Japon., Poiss., 1850, 272, 120, f. 3.—GÜNTHER, Fishes, ii, 1860, 377; Jour. Mus. Godeff. Heft., xi, 1876, Fische der Sudsee, H v, 155.—BLEEKER, Act. Soc. Sc. Indo-Nederl., vi; New Guinea, 20.

Number of laminæ in the disk 13–14. D. 21. A. 21. The length the disk is contained $3\frac{1}{4}$ to $3\frac{1}{5}$ times in the total length; the width tween the pectorals is contained $5\frac{1}{3}$ to $5\frac{1}{10}$ times in the same. The an of the mouth is situated in the vertical from the third lamina of the di The length of ventral fin equals the distance between the root of pectoral and the posterior margin of the eye.

Lengths 7.40; 5.10 inches.

Locality: Bay of La Paz, Lower California.

ENGRAULIDIDÆ.

ENGRAULIS RINGENS, *Jenyns* [No. 12965]

SILURIDÆ.

ÆLURICHTHYS PANAMENSIS, *Gill* [Nos. 17548, 17549].

Ælurichthys panamensis, GILL, Proc. Acad. Nat. Sci. Phila., 1863, 172.—GÜNTHER, Cat. Fishes, v, 1864, 179; Trans. Zoöl. Soc. London, vi, 1869, 476.—STEINDACHNER, Sitzb. d. k. Akad. d. Wiss. Wien, lxxii, 1875, Ichthyologische Beiträge, iv, 14.

Ælurichthys nuchalis, GÜNTHER, Trans. Zoöl. Soc. London, vi, 1869, 476, pl. 81, f. 2; Cat. Fish., v, 1864, 179.

Locality: Pacific coast of Lower California; a special locality, Boca Solidad.

OPHICHTHYIDÆ.

OPHICHTHYS TRISERIALIS, (*Kaup*) *Gthr.* [No. 17542].

Ophichthys triserialis, GÜNTHER, Cat. Fishes, viii, 1870, 58.

Muræno psis triserialis, KAUP., Apod. Fish., 1856, 12.

Herpetoichthys collisoma, ABBOTT, Proc. Acad. Nat. Sci. Phila., 1860, 475.

Ophisurus californiensis, GARRETT, Proc. Calif. Acad. Nat. Sci., iii, 1867, 66.

Locality: Lower California.

Günther states that there are one or two series of smaller brown spots along the abdomen. We obtained two specimens of this fish, and neither shows any brown spots on the abdomen. In every other respect they agree with Abbott's description.

RHINOBATIDÆ.

RHINOBATUS PRODUCTUS, *Ayres* [No. 18352].

Rhinobatus productus (AYRES, MSS.), GIRARD, Proc. Acad. Nat. Sci. Phila., 1854, 196; U. S. P. R. R. Rep., x, 1858, part iv, 370.

Rhinobatus leucorhynchus, GÜNTHER, Proc. Zoöl. Soc. London, 1866, 604; Trans. Zoöl. Soc. London, 1868, 490; Cat. Fish., viii, 1870, 444 (fig. of snout).

Female.—The anterior nasal valve is dilated into a very narrow lateral fold, scarcely projecting beyond the nasal margin. The length of the nostril is slightly more than its distance from the lateral margin of the head, and more than the distance between the inner angles of the nostrils, and much less than the width of the mouth, which is very slightly arched. Snout produced, the distance between the outer angles of the nostrils being three-fifths of that between the mouth and the end of the snout. A series of small, depressed, polished spines along the median ridge of the back; groups of small polished tubercles on the

orbital margin and on the shoulder. A broad groove between the rostral ridges, which are separated along their entire length. Snout lighter colored than the rest of the body.

Length, 50 inches.

Locality: St. Bartholomé Bay, Lower California.

We have examined Girard's type in the National Museum, and have determined it to be identical with *leucorhynchus* of Günther. The "blackish band along the middle of the back, with diffused blotches upon the sides and a double band of the same color along the middle of the snout" are not discernible. The coloration is uniform, except the light-colored snout.

II.—*Fishes of the Hawaiian Group.*

TETRODONTIDÆ.

TETRODON IMPLUTUS, *Jenyns* [No. 17997].

Tetrodon implutus, JENYNS, Voy. Beagle, Fish., 1842, 152.

Tetraodon laterna, RICHARDSON, Voy. Sulphur, Zoöl., 1844, 124, pl. 61, f. 2; Rep. Ichth. Chin., Rep. 15th Meet. Brit. Assoc., 1846, 199.—BLEEKER, Verh. Bat. Gen., xxiv, 1852, Blootk. vissch., 23; Nat. Tyds. Ned. Ind., iii, 1852, Bydrage Ichth. Moluksch. eil., 299.—GÜNTHER, Fish. Zanz., 1866, p. 131.

Arothron laterna, BLEEKER, Enum. Pisc. Arch. Ind., 1859, 200.

Crayracion implutus, BLEEKER, Atl. Ichth., 1865, *Gymnod.*, p. 71.

Crayracion laterna, BLEEKER, Atl. Ichth., 1865, pl. 205, *Gymnod.*, pl. 1, f. 3.

Tetrodon hispidus, GÜNTHER, Cat. Fish., viii, 1870, 297 (in part—var. β, 298).

Locality: Honolulu Harbor, Oahu.

[redacted]

Baliste buniva, LACÉP., op. cit., v, 1803, 669, pl. 21, f. 1.

Balistes piceus, POEY, Proc. Acad. Nat. Sci. Phila., 1863, 180; Repert. Fis.-Nat., Cuba, ii, 1868, 435.

Melichthys ringens, BLEEKER, Atl. Ichth., v, 1865, 108, pl. 220, f. 2; *Balist.*, pl. vi, f. 2.

Balistes niger, GÜNTHER, Fish. Zanz., 1866, 135, pl. 19, f. 1.

Balistes bunira, GÜNTHER, Cat. Fish., viii, 1870, 227.

Locality: Honolulu, Oahu.

BALISTES VIDUA, *Richards*. [No. 17984].

Balistes vidua, RICHARDSON, Voy. Sulphur, Fish., 1844, 128, pl. 59, f. 9-10.—BLEEKER, Nat. Tyds. Ned. Ind., iii, 1852, Amboina, ii, 565.—HOLLARD, Ann. Sc. Nat., 1854, 4th series, Zoöl. i, 319.—GÜNTHER, Cat. Fish., viii, 1870, 216.

Melichthys vidua, BLEEKER, Atl. Ichth., v. 1865, 109, pl. 217, f. 2; *Balist.*, pl. iii. f. 2.

Locality: Honolulu Harbor, Oahu.

PLEURONECTIDÆ.

RHOMBOIDICHTHYS PANTHERINUS, (*Rüpp.*) *Gthr.*, 1798, [Nos. 17979, 17981].

Rhombus pantherinus, RÜPPELL, Atl. Fisch., 1828, 121, pl. 31, f. 1.—BLEEKER, Nat. Tyds. Ned. Ind., viii, 1855, Kokos-eil., iii, 178.

Rhombus paroimanus, BENNETT, Proc. Comm. Zoöl. Soc., i, 168.

Rhombus sumatranus, BLEEKER, Verh. Bat. Gen., xxi, 1852, *Pleuron.*, 14.

Rhomboidichthys pantherinus, GÜNTHER, Cat. Fish., iv, 1862, 436.—KLUNZ., Verh. z.-b. Ges. Wien, xxi, 1871, 571.

Locality: Honolulu Harbor, Oahu. Very abundant.

GOBIIDÆ.

CULIUS FUSCUS, (*Bl.*) *Bleek.* [No. 18000].

Pœcilia fusca, BLOCH., Syst. Ichth., ed. SCHN., 1801, 453.

Cobitis pacifica, FORSTER, Descr. Anim., ed. LICHT., 1844, 235.

Cheilodipterus culius, BUCHANAN HAMILTON, Fish. Ganges, 1822, 55, pl. 5, f. 16.

Eleotris nigra, QUOY & GAIM., Voy. Freyc. Zoöl., 1824, 259, pl. 60, f. 2.—CUV. & VAL., Hist. Nat. des Poiss., xii, 1837, 233.—BLEEKER, Verh. Bat. Gen., xxv, 1853, Nalezing. Ichth. Beng., 105, pl. 1, f. 3.

Eleotris mauritianus, BENNETT, Proc. Comm. Zoöl. Soc., i, 166.

Eleotris brachyurus, BLEEKER, Verh. Bat. Gen., xxii, 1849, *Blenn. en Gob.*, 20; Enum. Spec. Pisc. Arch. Ind., 1859, 114.

Eleotris melanurus, BLEEKER, Verh. Bat. Gen., xxii, 1849, *Blenn. en Gob.*, 21.

Eleotris pseudacanthopomus, BLEEKER, Nat. Tyds. Ned. Ind., iv, 1853, Sumatra, ii, 276.

Culius niger, BLEEKER, Nat. Tyds. Ned. Ind., xi, 1856, Bœrœ, 411.

Eleotris fusca, GÜNTHER, Cat. Fish., iii, 1861, 125.—DAY, Proc. Zoöl., Soc., London, 1869 517.

Eleotris incerta, BLYTH., J. A. S., of Bengal, 1860, 146.—DAY, Proc. Zoöl. Soc. London 1869, 517.

Eleotris soaresi, PLAYFAIR, Fish. Zanz., 1866, 74. pl. 9, f. 4.

Culius fuscus BLEEKER, Arch. Néerland., ix, 1874, 303; x, 1875, 105.

Locality: Fresh-water streams of Oahu.

BRACHYELEOTRIS CYANOSTIGMA, *Bleek.* [No. 15395].

Eleotris cyanostigma, BLEEKER, Nat. Tyds. Ned. Ind., viii, 1855, Kokos-eil., iv, 452.—GÜNTHER, Cat. Fish., iii 1861, 119.—PLAYFAIR, Proc. Zoöl. Soc. London, 1867 862.

Eleotriodes cyanostigma, BLEEKER, Enum. Spec. Pisc. Arch. Ind., 1859, 112.

Brachyeleotris cyanostigma, BLEEKER, Arch. Néerland., ix, 1874, 306; x, 1875, 106.

D. $6\frac{1}{11}$. A. 10. L. lat. 25. L. trans. 8–9.

Height of the body equals the length of the head, and is slightly more than one-fifth of the total length; eye not quite one-third of the length of the head, and slightly longer than the snout; the jaws equal anteriorly, and the end of the superior extends beyond the vertical from the anterior margin of the orbit. Teeth in a villiform band; an external series of longer ones; a lateral canine tooth on each side of the lower jaw, hooked backward. Præoperculum armed at the angle with a group of four small spines, coalescing by their bases. Scales ctenoid. Head covered with large scales; snout, interorbital space and maxillaries naked. The third dorsal spine produced into a filament; posterior rays of soft dorsal and anal prolonged back to the base of the caudal fin.

species, which agrees perfectly well in every other particular with *cyanostigma*. The specimens, as may be seen, are quite small, and the spines have more of the appearance of excrescences than of permanent armatures.

SICYOPTERUS STIMPSONI, (*Gill*) *Bleek.* [No. 17991].

Sicydium (*Sicyopterus*) *stimpsoni*, GILL, Proc. Acad. Nat. Sci. Phila., 1860, 101.
Sicydium stimpsoni, GÜNTHER, Cat. Fish., iii, 1861, 93.
Sicyopterus stimpsoni, Bleeker, Arch. Néerland., ix, 1874, 313.

Locality: Fresh-water streams of Oahu.

AWAOUS CRASSILABRIS, (*Gthr.*) *Streets* [Nos. 17974, 17996].

Gobius crassilabris, GÜNTHER, Cat. Fish., iii, 1861, 63.

Locality: Fresh-water streams of Oahu.

There is a marked difference between the sexes of this species, as there is probably in other species of *Gobiidæ*. Professor Gill first suggested to us this probable difference, and our dissections confirmed his suggestion.

In the males the anal papilla is triangular, with a prolonged and slender apex; while in the females it is short, broadly quadrilateral, and the free margin fringed, and sometimes emarginate. The difference extends to the head also. In males it is broad, rounded in front, and the upper profile of the snout is slightly inclined downward, as in the typical *Gobius*; the lips are thick, and the end of the superior maxillary bone extends to or beyond the vertical from the center of the eye. The head of a female is narrower, more pointed in front, the lips less turned, and the end of the upper maxillary is anterior to the vertical from the center of the eye. In one specimen, a young male, we failed to find any evidence of testicles. In this the anal papilla was similar to those of the other male specimens, while the general features of the head were those of a female. In Günther's description these differences are for the most part confounded, and it would be impossible to identify the species from one sex only, but if both are at hand they conform to it in every particular.

ACENTROGOBIUS OPHTHALMOTÆNIA, (*Bleek.*) *Streets* [No. 15399].

Gobius ophthalmotænia, BLEEKER, Nat. Tyds. Ned. Ind., vii, 1854, Kokos-eil., i, 46.—GÜNTHER, Cat. Fish., iii, 1861, 37.

Gobius capistratus, PETERS, Arch. f. Naturg., 1855, pt. i, 251.—GÜNTHER, op. cit., iii, 1861, 36.—KLUNZINGER, Verh. z.-b. Ges. Wien, 1871, 476.

D. $6\frac{1}{11}$. A. $\frac{1}{10}$. L. lat. 27. L. trans. 8–9.

The height of the body is contained from 5 to $5\frac{2}{3}$ times in the total length, including the caudal fin; without the caudal it is from 4 to $4\frac{1}{2}$; the length of the head is contained from 4 to $4\frac{1}{4}$ times in the total length, including caudal; without caudal, from $3\frac{1}{3}$ to $3\frac{1}{2}$ times. Head convex above, nearly as broad as high, the width is contained about $1\frac{1}{2}$ times in the length, and the height about $1\frac{1}{3}$ times in the same; the diameter of the eye is one-fourth of the length of the head; interorbital space narrow; length of the snout about equals the diameter of the eye, obtuse; upper and lower jaws subequal in front; the end of the upper extends to under the anterior portion of the eye; cleft of the mouth slightly oblique. Teeth in the jaws in several series, an external series of enlarged teeth; in the lower jaw on either side a canine tooth, hooked backward. Neck and crown of head, cheeks, and opercles scaly. Scales on the body ctenoid. Dorsal fins not continuous, the spinous portion lower than the soft, which is as high as the body; spinous more than one-half as long as the soft. Upper pectoral rays silky in smaller specimens only; caudal rounded, as long as the head. Greenish, with five broad, brown streaks along the back, and five others, smaller and re-

Gobius kokius, CUV. & VAL., op. cit., xii, 1837, 68.—JERDON, Madr. Jour., xv, 148.—BLEEKER, Verh. Bat. Gen., xxii, 1849, *Blenn. en Gob.*, 24.—CANTOR, Catal., 180.—JACQ., Voy. Ind. Poiss., 1835, pl. 14, f. 3.

Gobius russelii, CUV. & VAL., op. cit., xii, 1837, 75.

Gobius catebus, CUV. & VAL., op. cit., xii, 1837, 76.

Gobius kora, CUV. & VAL., op. cit., xii, 1837, 77.

Gobius celebicus, CUV. & VAL., op. cit., xii, 1837, 74.—BLEEKER, Nat. Tyds. Ned. Ind., vii, 1854, Banten, 318.

Gobius kurpah, SYKES, Trans. Zoöl. Soc. London, ii, 1841, 352, pl. 61, f. 1.

Gobius platycephalus, PETERS, Monatsber. Berl. Acad., 1852, 681.

Gobius phaiosoma, BLEEKER, op. cit., xxii, 1849, *Blenn. en Gob.*, 30; Nat. Tyds. Ned. Ind., 1851, i, f. 5.

Gobius fusiformis, BLEEKER, op. cit., xxii, 1849, *Blenn. en Gob.*. 30.

Gobius fasciato-punctatus, RICHARDSON, Voy. Sulph. Ichth., 1844, 145, pl. 62, f. 13, 14.

D. $6\frac{1}{9}$. A. $\frac{1}{8}$. L. lat. 33.

Ten longitudinal series of scales between the second dorsal and anal fins. Height of the body is one-sixth or one-seventh of the total length, and the length of the head is one-quarter of the same. Head depressed, broader than long, the breadth is four-fifths of the length, and the height is three-fifths of the same. The diameter of the eye is contained $3\frac{1}{2}$ or 4 times in the length of the head. Interorbital space flat, proportionately broader in larger specimens than in smaller ones; in the former it nearly equals the vertical diameter of the eye. Snout depressed, length equals the diameter of the eye, upper profile obliquely descending; cleft of the mouth nearly horizontal; lower jaw prominent; the end of the upper extends to the vertical from the center of the eye. Teeth in a villiform band; an external enlarged series; no prominent canines. Upper surface and sides of the head naked; scales on the neck much smaller than those on the sides of the body; they extend nearly as far forward on the occiput as a line from the posterior border of the præoperculum. Second dorsal fin higher than the first, and nearly as high as the body; the distance of the first dorsal from the eye equals that of the snout from the posterior margin of the præoperculum. Ventrals extend nearly to the vent; pectorals somewhat longer. Caudal rounded, shorter than the head. Yellowish-brown, with five or six broad brown bands across the back; the color of these bands sometimes rather faint, and their outlines indistinct. Along the sides of the body, and alternating with the dorsal bands, is a series of rounded deep brown blotches. Under the lens all the coloration on the sides is resolved into minute dots; head dotted. A small brown spot on the

middle of the operculum; another behind the eye, and sometimes there is one present on the upper part of the base of the pectoral. Fins minutely dotted, on the dorsal and caudal fins the dots are aggregated, and arranged in lines. No cross-streak between the eyes.

Lengths, 2.10, 1.40, 1.40 inches.

Locality: Coral reefs of Oahu.

SCORPÆNIDÆ.

SEBASTAPISTES STRONGIA,* (*Cuv. & Val.*) [No. 15400].

Scorpæna strongia, CUV. & VAL., Hist. Nat. des Poiss., iv, 1829, 323.—QUOY & GAIM., Voy. Astrol. Poiss., 1834, 688, pl. 11, f. 2.—LESSON, Voy. Coquil. Poiss., 1830, 213.—GÜNTHER, Jour. Mus. Godeff., ii, 1873–'75, Fische der Sudsee, i, 80 (not of Cat. Fish., ii, 1860, p. 105).

D. $11\frac{1}{9}$. A. $\frac{3}{5}$. L. lat. 45–47.

Teeth on the vomer and palatine bones; those on the latter in a narrow band.

Height of the body is contained $3\frac{1}{2}$ times in the total length, and the length of the head 3 times in the same. Interorbital space one-half the diameter of the eye; and the latter is contained three times in the length of the head. Snout as long as the diameter of the eye; jaws subequal in front; no skinny flaps. The end of the upper maxillary extends to the vertical from the center of the eye. Interorbital space deeply concave, a longitudinal ridge on either side of the bottom of the

[redacted]

ridges running from their bases bridge the short concavity behind; on the middle of the snout are two low ridges, diverging anteriorly. Præorbital spines conspicuous; two, larger than the rest, diverge from a common base; the posterior and larger is directed downward across the superior maxillary bone; the other is directed inward close to the body of the bone; above the base of the posterior is another directed backward; the surface of the præorbital irregularly ridged; some of the ridges ending in spines; rudimentary scales on sides of the head. The spinous portion of the dorsal fin higher than the soft. The third and fourth spines are the longest, shorter than the second anal, and nearly one-half the length of the head; second anal longer than the third, stout and striated. Whitish, clouded and spotted with dark brown, and dotted all over with minute dark brown dots. The brown spots on the head are separated by bluish-white lines.

Total length, 2.60 inches.

Locality: Honolulu, Oahu.

LABRIDÆ.

PSEUDOCHEILINUS HEXATÆNIA, *Bleek.* [No. 17989].

Cheilinus hexatænia, BLEEKER, Act. Soc. Sc. Indo.-Nederl., ii, 1857, Amboina, viii, 84.
Pseudocheilinus hexatænia, BLEEKER, Atl. Ichth., i, 1862, *Labr.* 73, pl. 23, f. 2.—GÜNTHER, Cat. Fish., iv, 1862, p. 134.—KLUNZINGER, Verh. z.-b. Ges. Wien, 1871, 537.
Pseudocheilinus psittaculus, KNER & STEINDACHNER, Sitz. d. k. Ak. Wiss. Wein, liv, 1866, 376, f. 7.

D. $\frac{9}{12}$. A. $\frac{3}{10}$. P. $\frac{2}{12}$. L. lat. 24. L. trans. $\frac{2}{6}$.

The height of the body equals the length of the head, and is contained $3\frac{1}{2}$ times in the total length; head longer than high, with the upper profile slightly concave, vertex convex; the diameter of the eye is one-fifth of the length of the head; the snout about one-third the length of the head; interorbital space equals the diameter of the eye; jaws equal anteriorly; chin not prominent; the end of the upper maxillary bone does not extend to the vertical from the anterior border of the orbit; its length is contained 3 times in the length of the head. Teeth in a single series; six canines in the upper jaw anteriorly, the posterior pair much larger than the others, and bent outward and backward; two canines in the lower jaw anteriorly; no posterior canines. Three series of large scales on the cheeks, the lower series covering the limb of the

præoperculum; præoperculum subrectangular, posterior border entire, membranous, angle obtusely rounded; operculum scaly. A row of elongated scales on each side of the vertical fins, forming sheaths at their bases; two elongated scales between the ventrals. Lateral line interrupted; tubules simple. The soft portion of the dorsal fin higher than the spinous; spines subequal; second anal spine the longest; the posterior rays of the soft dorsal and anal prolonged. Pectorals rounded, seven times in the total length. Ventrals pointed; their length is contained $8\frac{2}{3}$ times in the total length. Caudal rounded. Color (in alcohol) olive-green, diluted inferiorly, with seven blackish, longitudinal bands, which increase slightly in breadth posteriorly; the four upper bands commence above the level of the inferior border of the orbit; the two following begin in the axillary space; the lowest indistinct. Five of the bands are continued on the caudal peduncle; the upper and lower cease opposite the termination of the dorsal and anal fins. A narrow white line on the middle of the snout, extending from between the eyes to the extremity of the snout. Short linear spots on the dorsal fin; the rays and spines green. No ocellus on the upper part of the base of the caudal, or anywhere on the caudal peduncle.

Total length, 4.20 inches.

Locality: Honolulu, Oahu.

This fish is so characteristic that we do not hesitate to pronounce it *hexatænia*, although there are a great many discrepancies between the above description and those given by Bleeker and others. We find three series of scales on the cheeks, instead of two, and six canine teeth

STETHOJULIS AXILLARIS, (*Q. & G.*) *Bleeker* [No. 15394].

Julis axillaris, QUOY & GAIM., Voy. Uran. Zoöl. Poiss., 1824, 272.—CUV. & VAL., Hist. Nat. des Poiss., xiii, 1839, 472.

Julis (*Halichoeres*) *bandanensis*, BLEEKER, Nat. Tyds. Ned. Ind., ii, 1851, Banda, i, 254.

Stethojulis axillaris, BLEEKER, Atl. Ichth., i, 1862, *Labr.*, 136, pl. 44. f. 7.—GÜNTHER, Cat. Fish., iv, 1862, 142.—KLUNZINGER, Verh. zoöl.-bot. Gesells. Wien, xxi, 1871, 541.

D. $\frac{9}{11}$. A. $\frac{2}{11}$. P. $\frac{2}{17}$. L. lat. 27. L. trans. $\frac{2}{5}$.

We have examined seven specimens from this locality, and not one of them showed more than two spinous rays in the anal fin. This is interesting, from the fact that all the authorities whom we have consulted give three spines to this fin.

Locality: Honolulu, Oahu.

CHEILIO INERMIS, (*Forsk.*) *Richards.* [No. 17977].

Labrus inermis, FORSKAL, Descr. Anim., 1775, 34.—BLOCH, Syst. Ichth., ed. SCHN., 1801, 262.

Labrus hassek, LACÉP., Hist. des Poiss., iii, 1803, 513.

Cheilio auratus (COMMERS.), LACÉP., op. cit., iv, 1803, 433.—QUOY & GAIM., Voy. Uran. Zoöl., 1824, 274, pl. 54, f. 2.—CUV. & VAL., Hist. Nat. des Poiss., xiii, 1839, 341.—BLEEKER, Nat. Tyds. Ned. Ind., ii, 1851, Celebes, i, 221.

Cheilio fuscus (COMMERS.), LACÉP., Hist. des Poiss., iv, 1803, 433.—CUV. & VAL., op. cit., xiii, 1839, 349.

Labrus fusiformis, RÜPPELL, N. W. Fische, 1837, 7, pl. 1, f. 4.

Cheilio cyanochloris, CUV. & VAL., op. cit., xiii, 1839, 346, pl. 382.

Cheilio forskalii, CUV. & VAL., op. cit., xiii, 1839, 349.

Cheilio hemichrysos, CUV. & VAL., op. cit., xiii, 1839, 351.—BLEEKER, Nat. Tyds. Ned. Ind., ii, 1851, Banda, i, 255.

Cheilio viridis, CUV. & VAL., op. cit., xiii, 1839, 352.

Cheilio microstoma, CUV. & VAL., op. cit., xiii, 1839, 353.

Cheilio ramosus, JENYNS, Zoöl. Beagle, Fish., 1842, 102.

Chilio auratus, PETERS, Monatsb. Preuss. Ak. Wiss., 1855, 453.

Chilio bicolor, BIANC., Menn Ac. So. Bologn., viii, 1859, Spec. Zoöl. Mosamb., 46, pl. 25.

Cheilio inermis, RICHARDSON, Rep. Ichth. Chin. Jap., Rep. 15th Meet. Brit. Assoc., 1846, 258.—BLEEKER, Atl. Ichth., i, 1862, *Labr.*, 82, pl. 31, f. 4.—GÜNTHER, Cat. Fish., iv, 1862, 194.

Chilio inermis, KLUNZINGER, Verhn. zoöl.-bot. Gesells. Wien, xxi, 1871, 530.

Five specimens gave the following formula for the dorsal and anal fins:

D $\frac{9}{13}$. A $\frac{3}{11}$.

Locality: Honolulu, Oahu.

? JULIS MELANOPTERA, *Gthr.* [No. 15401].

Julis melanoptera, GÜNTHER, Cat. Fish., iv, 1862, 183.

D. $\frac{8}{13}$. A. $\frac{2}{11}$. L. lat. 27. L. trans. $\frac{2\frac{1}{2}}{9}$.

The height of the body is slightly more than the length of the head, and one-fourth of the total length (the caudal lobes not included). The diameter of the eye is two-ninths of the length of the head, and one and a half times in the length of the snout. No posterior canine teeth; two anterior canine teeth of the lower jaw are received between the two of the upper. Dorsal spines pungent, shorter than the rays; caudal lobes produced; ventrals pointed, not prolonged, and are five-sevenths of the length of the pectorals; the latter shorter than the head—seven-ninths of its length. A few scales on the supraopercular region. Colors in alcohol:—head uniform dark purplish, without any marking; body brownish-olive; dorsal and anal fins dark violet, the former with a black spot anteriorly between the first and fourth spines; pectoral with an oblique oblong black spot, and a black spot above on the base of the fin.

Locality: Honolulu, Oahu.

The only point about this description which renders the identification anyways doubtful is the absence of the "broad, lighter, transverse band below the second to the sixth dorsal spines, extending to the belly;" the colors are somewhat faded, which, probably, accounts for its absence. There is no habitat assigned to the species by Günther, but he gives Ceylon as a probable locality.

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Glyphisodon rahti, CUV. & VAL., op. cit., v, 1830, 456; ix, 1833, 507.—BLEEKER, Nat. Tyds. Ned. Ind., iii, 1852, Amb. & Cer., 287.—RICHARDSON, Rep. Ichth. Chin., Rep. 15th Meet. Brit. Assoc., 1846, 253.

Glyphisodon cœlestinus (SOLAND.), CUV. & VAL., op. cit., v, 1830, 464; ix, 1833, 508.—RICHARDSON, op. cit., 1846, 253.—BLEEKER, Verh. Bat. Gen., xxi, 1846, *Labr. Cten.*, 15.

Glyphisodon tyrwhitti, RICHARDSON, op. cit., 1846, 253.

Glyphisodon quadrifasciatus, BLEEKER, Verh. Bat. Gen., xxi, 1846, *Labr. Cten.*, 17.

Glyphisodon waigiensis, BLEEKER, Verh. Bat. Gen., xxi, 1846, *Labr. Cten.*, 13.

Sparus fasciatus, GRONOOV., Syst. (1780), ed. GRAY, 1854, 60.

Glyphidodon saxatilis, GÜNTHER, Cat. Fish., iv, 1862, p. 35.—KLUNZINGER, Verhn. zoöl.-bot. Ges. Wien, xxi, 1871, 524.

Glyphidodon cœlestinus, GÜNTHER, Cat. Fish., iv, 1862, 38.

Locality: Honolulu, Oahu.

Our specimens from this locality agree more closely with Günther's description of *G. saxatilis*, than with that of *G. cœlestinus;* which, however, they should correspond with, if there were any real specific differences between them. We, therefore, do not hesitate to refer them both to one species, as has been done by Klunzinger.

ACANTHURIDÆ.

ACANTHURUS TRIOSTEGUS, var. SANDVICENSIS, *Streets.* [No. 15398].

Our collection from these islands does not contain a single specimen of the typical *triostegus*. We have twenty-three specimens, collected in the harbor of Honolulu, varying in length from 1.2 to 4.8 inches, and they present certain peculiarities in common which stamp them as a well-marked variety.

The band down the middle of the forehead to the extremity of the snout is absent. The second vertical line on the side of the body ceases, as in *triostegus*, in the axil of the pectoral fin; but, instead of there being but a small round black spot on the outer surface of the base of that fin, as in the typical examples, there commences, in the same situation, a line which passes obliquely downward and backward to near the ventral surface of the body. Finally, in *A. triostegus* there is a small black spot on either side of the caudal peduncle inferiorly and one superiorly; in our variety, the lower spots are invariably wanting. In every other respect the specimens correspond exactly to the description as given by Günther. These differences cannot depend upon age, for we have com-

pared them with specimens of the same size from other localities, and find the peculiarities to hold good. Cuvier and Valenciennes only, of ichthyological writers, speak of the presence, sometimes, of a line on the breast—"Il y a quelquefois de chaque côté de la poitrine une ligne ou una série longitudinale de points bruns"—but it is not associated in their description with the absence of the other markings which we have mentioned.

Locality: Harbor of Honolulu, Oahu.

ACANTHURUS BLOCHI, *C. & V.* [Nos. 15397, 17973].

Acanthurus blochi, CUV. & VAL., Hist. Nat. des Poiss., x, 1835, 209.—GÜNTHER, Jour. Mus. Godeff., ii, 1873–'75, Fische der Sudsee, i, 109, pl. 69, f. B.

Acanthurus annularis, CUV. & VAL., op. cit., x, 1835, 209 (young).

Acanthurus xanthopterus, CANTOR, Mal. Fish., 209, f. 4 (nec C. & V).

Acanthurus matoides, GÜNTHER, Cat. Fish., iii, 1861, 330.—KLUNZINGER, Verh. zoöl.-bot. Gesel., xxi, 1871, Fisch. d. Roth. Meer, 508.

Locality: Harbor of Honolulu, Oahu.

NASEUS UNICORNIS, (*Forsk.*) *Gthr.* [No. 17976].

Chætodon unicornis, FORSK., Descr. Anim., 1775, 63.

Monoceros raii, BLOCH, Syst. Ichth., ed. SCHN., 1801, 181.

Monoceros biaculeatus, BLOCH, Syst. Ichth., ed. SCHN., 1801, 180, pl. 42.

Nascus fronticornis, CUV. & VAL., Hist. Nat. des Poiss., x, 1835, 259.—SCHLEG., Faun. Japon. Poiss., 1850, 129, pl. 69.

Harparus monoceros, FORSTER, Descr. anim., 1844, 219.

Nascus unicornis, GÜNTHER, Cat. Fish., iii, 1861, 348.—KLUNZINGER, Verh. zoöl.-bot. Ges., xxi, 1871, Fisch. d. Roth. Meer 512.—GÜNTHER, Jour. Mus. Godeff., ii, 1873–'75, Fische der Sudsee, i, 118, pl. 78.

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Height of the body is contained $4\frac{3}{4}$ times in the total length, and the length of the head slightly more than 4 times in the same. The diameter of the eye is one-fourth of the length of the head, and equals the length of the snout, and interorbital space. Interorbital space elevated into a median crest. Lower jaw projecting beyond the upper; the end of the latter extends somewhat beyond the vertical from the anterior margin of the eye. Breast scaly; lateral line scarcely bent; scales becoming plate-like below the middle of the second dorsal fin. Pectoral slightly longer than the head. Opercular spot distinct.

Locality: Harbor of Honolulu, Oahu.

On comparing this species with indubitable specimens of *crumenophthalmus* from the Atlantic, we find the following characteristic differences. In the latter the eye is much larger—little over three times in the length of the head; the interorbital space is much more flattened; the end of the upper jaw extends further backward; and the pectoral fin is shorter—not equal to the head-length. A more important character, however, is in the shape of the interopercular bone. In *mauritianus* it is very obliquely rounded, and the triangular space of the isthmus is almost wholly exposed between the edges of the bones of the opposite sides; in the Atlantic fish, on the contrary, the interoperculum is nearly rectangular, and the inferior edges of the bones overlap along nearly the entire extent of the isthmus, leaving but a very small space of it uncovered at the angles, which are slightly rounded; there is also a broad, shallow notch on the posterior border of the bone. Cuvier and Valenciennes, in their diagnosis of the species, direct attention to this character, which seems to have been entirely overlooked by later ichthyologists.

C. hasselti, Gthr., is probably synonymous with this species.

CARANGUS MELAMPYGUS, (*C. & V.*) *Streets* [No. 17980].

Caranx melampygus, Cuv. & Val., Hist. Nat. des Poiss., ix, 1833, 116.—Günther, Cat. Fish., ii, 1860, 446; Jour. Mus. Godeff., 1876, pt. xi, Fische der Sudsee, pt. v. 133, pl. 86.

Caranx stellatus, Eyd. & Soul., Voy. Bonite, Poiss. 167, pl. iii, f. 2.—Günther, Cat. Fish., ii, 1860, 436.

Caranx bixanthopterus, Rüpp., N. W. Fische, 1837, 49, pl. 14, f. 2.—Klunzinger, Verh. zoöl.-bot. Ges., xxi, 1871, Fisch. d. Roth. Meer, 464.

D. $8\frac{1}{22-24}$. A. $2\frac{1}{19}$. L. plates 36.

The number of rays in the anal fin did not vary in the five specimens

examined. The anterior, pointed portions of the second dorsal and anal blackish.

Locality: Harbor of Honolulu, Oahu.

CARANGUS CHRYSOS, (*Mitch.*) *Gill* [No. 17987].

Scomber carangus, BLOCH, Naturg. ausländ. Fische, 1785, 340.—BLOCH, Syst. Ichth., ed. SCHN., 1801, 28.

Scomber chrysos, MITCHELL, Trans. Lit. & Phil. Soc. New York, i, 1815, 424.

Caranx carangus, CUV. & VAL., Hist. Nat. des Poiss., ix, 1833, 91.—CUV., Règne Anim. Ill. Poiss., 1829-'30, pl. 57, f. 2.—GUICHEN., Poiss. ROMON DE LA SAGRA, Hist. Cuba, 111.—GÜNTHER, Cat. Fish., ii, 1860, 448.

Caranx chrysos, CUV. & VAL., op. cit., ix, 1833, 98 (*nec* DeKay, Gthr., *et al.*).

Caranx ekala, CUV. & VAL., op. cit., ix, 1833, 117.

Caranx xanthopygus, CUV. & VAL., op. cit., ix, 1833, 109.

Carangus esculentus, GIRARD, U. S. & Mex. Bound. Surv., 23, pl. xi, f. 1-3.

Carangus chrysos, GILL, Proc. Acad. Nat. Sci. Phila., 1862, 434.

D. $8\frac{1}{20-22}$. A. $2\frac{1}{17-18}$. Lat. plates 31.

Height of body contained 4 times in the total length, and length of head 3 times in the same. Breast naked. Lower jaw has larger teeth intermixed with the others; end of the upper jaw extends beyond the vertical from the center of the eye. An opercular spot; margin and point of second dorsal fin blackish; anal yellow.

Length 4.80.

Locality: Honolulu, Oahu.

CHORINEMUS SANCTI PETRI, *Cuv. & Val.* [No. 17992].

Chorinemus sancti petri, CUV. & VAL., Hist. Nat. des Poiss., viii, 1831, 379, pl. 236.—

MULLIDÆ.

UPENEUS TRIFASCIATUS, (*Lacép.*) *Cuv. & Val.* [No. 17990].

Mullus trifasciatus, LACÉP., Hist. des Poiss., iii, 1803, 404, pl. 15, f. 1.

Mullus multifasciatus, QUOY & GAIM., Voy. Freyc. Poiss., 1824, pl. 59, f. 1.

Upeneus trifasciatus, CUV. & VAL., Hist. Nat. des Poiss., iii, 1829, 468.—JENYNS, Zoöl. Beagle, Fishes, 1842, 25.—BLEEKER, Nat. Tyds. Ned. Ind., ii, 1851, Banda, i, 237.—GÜNTHER, Cat. Fish., i, 1859, 407; Jour. Mus. Godeff., ii, 1873–'75, Fische der Sudsee, i, 59, pl. 44, f. B.-C.

Locality: Harbor of Honolulu, Oahu.

Two specimens. Both having a black spot behind the eye, as in *U. bifasciatus;* the color on the other parts of the body arranged as in *U. trifasciatus.*

UPENEOIDES VITTATUS, (*Forsk.*) *Bleek.* [No. 17999].

Mullus vittatus, FORSKAL, Faun. Arab., 31.—BLOCH, Syst. Ichth., ed. SCHN., 1801, 79.—LACÉP., Hist. des Poiss., iii, 1803, 382, 401, pl. 14, f. 1.—SHAW, Zoöl., iv, 1803, 616, pl. 89.

Mullus bandi, SHAW, op. cit., iv, 1803, 615.

Upeneus vittatus, CUV. & VAL., Hist. Nat. des Poiss., iii, 1829, 448.

Upeneus bivittatus, CUV. & VAL., op. cit., vii, 1831, 520.

Upeneus bitæniatus, BENNETT, Proc. Comm. Zoöl. Soc., 1830–'31, 59.

Upeneoides bivittatus, BLEEKER, Verh. Bat. Gen., xxii, 1849, *Perc.*, 64; Nat. Tyds. Ned. Ind., viii, 1855, Amboina, vi, 411.—DAY, Proc. Zoöl. Soc. London, 1867, 702.

Upeneoides vittatus, BLEEKER, Act. Soc. Reg. Sc. Ind. Neérl., ii, 1857, Amboina, 43.—GÜNTHER, Cat. Fish., i, 1859, 397; Jour. Mus. Godeff., ii, 1873–'75, Fische der Sudsee, i, 55.

Locality: Harbor of Honolulu, Oahu.

The oblique black bands on the lower caudal lobe are broader than those on the upper lobe.

SERRANIDÆ.

MORONOPSIS MARGINATUS, (*C. & V.*) *Gill.* [No. 17993].

Dules marginatus, CUV. & VAL., Hist. Nat. des Poiss., iii, 1829, 116, pl. 52.—HOMBRON et JAQUINOT, Dumont D'Urville, Voy. Pôle Sud, Poiss., 1853–'54, 41, pl. 3, f. 3.—GÜNTHER, Cat. Fish., i, 1859, 268; Jour. Mus. Godeff., ii, 1873, Fische der Sudsee, i, 24.

Dules malo, CUV. & VAL., op. cit., vii, 1831, 479.—DUMONT D'URVILLE, Voy. Pôle Sud, Poiss., 1853–'54, 41, pl. 3, f. 4.—GÜNTHER, Cat. Fish., i, 1859, 270.

Dules mato, LESSON, Voy. Coquille, Zoöl., ii, 1826–'30, 223.
Dules leuciscus, JENYNS, Zoöl. Beagle, Fish., 1842, 17.
Moronopsis ciliatus, BLEEKER, Arch. Neerl., 1872, 376.
Moronopsis marginatus, GILL, Proc. Acad. Nat. Sci. Phila., 1863, 83.

D. $9\frac{1}{11}$. A. $\frac{3}{11}$. L. lat. 53. L. trans. $\frac{5}{12}$.

Coloration as in *Dules marginatus*, as given by Günther in Fische der Sudsee. Sides of the body spotted.

Locality: Waialua, Oahu.

CHILODIPTERIDÆ.

APOGON AURITUS, *Cuv. & Val.* [No. 15396].

Apogon auritus, CUV. & VAL., Hist. Nat. des Poiss., vii, 1831, 443.—GÜNTHER, Jour. Mus. Godeff., ii, 1873, Fische der Sudsee, 1, 23.
Apogon punctulatus, RÜPPELL, N. W. Fische, 1837, 88, pl. 22, f. 4.
Apogon variegatus, VALENCIENNES, Nouv. Ann. Mus., i, 55.
Apogonichthys polystigma, BLEEKER, Nat. Tyds. Ned. Ind., vi, 1854, 484.
Apogonichthys auritus, GÜNTHER, Cat. Fish., i, 1859, 246.—PLAYFAIR, Fish. Zanz., 1866, 21.

Locality: Honolulu, Oahu.

PRIACANTHIDÆ.

PRIACANTHUS CAROLINUS, *Cuv. & Val.* [No. 17994].

Priacanthus carolinus, CUV. & VAL., Hist. Nat. des. Poiss., iii, 1829, 105.—LESSON, Voy. Coq. Zoöl. Poiss., ii, 1826–'30, 224.—BLEEKER, Nat. Tyds. Ned. Ind.,

CIRRHITIDÆ.

CIRRHITES FORSTERI, (*Bl.*) *Gthr.* [No. 17978].

Perca tæniata, FORSTER, Descr. Anim., ed. LICHT., 1844, 224.

Grammistes forsteri, BLOCH, Syst. Ichth., ed. SCHN., 1801, 191.

Sparus pantherinus, LACÉP., Hist. des Poiss., iv, 1803, 160, pl. 6, f. 1.

Cirrhites pantherinus, CUV. & VAL., Hist. Nat. des Poiss., iii, 1829, 70.—LESSON, Voy. Coq. Poiss., 1826–'30, 225, pl. 22, f. 1.—BLEEKER, Nat. Tyds. Ned. Ind., 1851, ii, Banda, i, 232.

Serranus tankervillæ, BENNETT, Fishes of Ceylon, 1834, pl. 27.

Cirrhites forsteri, GÜNTHER, Cat. Fish., ii, 1860, 71.—GILL, Proc. Acad. Nat. Sci. Phila., 1863, 107.—GÜNTHER, Jour. Mus. Godeff, ii, 1874, Fische der Sudsee, i, 69, pl. 49, f. A.

Paracirrhitus forsteri, BLEEKER, Verh. k. Ak. Weten Amst., 1875, xv, 6.

Locality: Honolulu, Oahu.

MUGILIDÆ.

MUGIL CEPHALOTUS, *Cuv. & Val.* [Nos. 18002, 18003].

Mugil cephalotus, CUV. & VAL., Hist. Nat. des Poiss., xi, 1836, 110.—GÜNTHER, Cat. Fish., iii, 1861, 419.

Mugil japonicus, SCHLEG., Faun. Japon. Poiss., 1850, 134, pl. 72, f. 1.

Mugil macrolepidotus, RICHARDSON, Rep. Ichth. Chin., Rep. 15th Meet. Brit. Assoc., 1846, 249.

D. $4\frac{1}{8}$. A. $\frac{3}{8}$. L. lat. 40–42. L. trans. 14–15.

The height of the body and the length of the head are nearly equal, and are one-fifth of the total length. Snout broad, depressed, longer than the eye; lips thin, provided with minute cilia. Deep cavity in front of the vomer. The angle formed by the lower jaw in front is a right angle; a narrow stripe of the maxillary is visible behind the intermaxillary; præorbital not emarginate, finely denticulated on its anterior edge and at its extremity, which is obliquely truncated. Cleft of the mouth is not twice as broad as deep. The width of the interorbital space is contained more than twice in the length of the head. Eye nearly covered with a broad adipose membrane, leaving the pupil exposed through a narrow vertical slit in the middle. Three series of scales between the eye and the inferior border of the præoperculum; angle of præoperculum produced posteriorly. Pectoral inserted above the middle of the height of the body; it terminates on the eighth scale of the lateral line; spinous dorsal commences on the tenth scale of the lateral

line, and on the twenty-second from the end of the snout; anterior dorsal spines more than one-half the length of the head, and they are situated on the middle between the end of the snout and the base of the caudal fin. The second dorsal commences on the twenty-third row of scales of the lateral line; the space between the origins of the two dorsals nearly equals the length of the head. Ventrals midway between the base of the pectoral and the spinous dorsal. Anal commences before the soft dorsal; both emarginate behind.

Shining golden, darker above, with longitudinal streaks along the series of scales.

Locality: Harbor of Honolulu, Oahu. Very numerous.

There seems to be very little difference between this species and *Mugil dobula*, Gthr.

AULOSTOMIDÆ.

AULOSTOMA CHINENSE, (*L.*) *Schleg.* [No. 15371].

Fistularia chinensis, LINN., Syst. Nat. i, 1766, 515.

Aulostoma chinensis, LACÉP., Hist. des Poiss., v, 1803, 357.

Aulostoma chinense, SCHLEG., Faun. Japon. Poiss., 1850, 320.—RICHARDSON, Rep. Ichth. Chin., Rep. 15th Meet. Brit. Assoc., 1846, 247.—PETERS, Arch. f. Naturg., 1855, i, 258.—GÜNTHER, Cat. Fish., iii, 1861, 538.

Polypterichthys valentini, BLEEKER, Nat. Tyds. Ned. Ind., iv, 1853, Ternate, ii, 608.

D. 10–27. A. 28.

Brownish, with vertical bands along the sides of the body and snout; one or two of the bands on the snout oblique. Base of soft dorsal and

Fistularia serrata, CUV., Règne Anim., 1817.—GÜNTHER, Cat. Fish., iii, 1861, 533.

Fistularia commersoni, RÜPPELL, N. W. Fische, 1837, 142.—PETERS, Arch. f. Naturg., 1855, i, 258.

Cannorhynchus immaculatus, CANTOR, Catalogue, 211.

Locality: Honolulu Harbor, Oahu.

BELONIDÆ.

BELONE PLATURA, *Rüpp.* [No. 17983].

Belone platura, RÜPPELL, N. W. Fische, 1837, 73, pl. 20, f. 1.—CUV. & VAL., Hist. Nat. des Poiss., xviii, 1846, 451.—BLEEKER, Act. Soc. Sc. Indo-Ned., ii, 1857, Amboina, viii, 85.—GÜNTHER, Cat. Fish., vi, 1866, 237.—KLUNZINGER, Verh. zoöl.-bot. Ges., xxi, 1871, Fische d. Roth. Meer, 577.

Belone carinata, CUV. & VAL., op. cit., xviii, 1846, 437.—GÜNTHER, Cat. Fish., vi, 1866, 236.

D. 14–15. A. 19–20.

Body subpentagonal; tail depressed, strongly carinated; the median shallow groove on the upper surface of the head scaly. Two specimens gave nineteen rays in the anal fin, and one gave twenty.

Length, 15 inches.

Locality: Harbor of Honolulu, Oahu.

SCOMBERESOCIDÆ.

EXOCŒTUS SPECULIGER, *Cuv. & Val.* [No. 17985].

Exocœtus speculiger, CUV. & VAL., Hist. Nat. des Poiss., xix, 1846, 94.—BLEEKER, Ned. Tydsch. Dierk., iii, 1865, 122.—GÜNTHER, Cat. Fish., vi, 1866, 287.

Origin of the dorsal fin is behind the anal; pectoral with an oblique white band across its lower half anteriorly; white edged. Ventrals white; grayish in the axil, and with the middle rays gray.

Locality: Hawaiian Islands.

EXOCŒTUS BRACHYPTERUS, *Solander* [No. 17986].

Exocœtus brachypterus, SOLANDER, MSS.—RICHARDSON, Rep. Ichth. Chin., Rep. 15th Meet. Brit. Assoc., 1846, 265.—GÜNTHER, Cat. Fish., vi, 1866, 280.

Exocœtus mento, CUV. & VAL., Hist. Nat. des Poiss., xix, 1846, 124.—BLEEKER, Verh. Bat. Gen., xxiv, 1852, Snœk., 21.—GÜNTHER, Cat. Fish., vi, 1866, 281.

Parexocœtus mento, BLEEKER, Ned. Tydschr. Dierk., iii, 1865, 126.

D. 12. A. 13.

One or two very short barbules at the symphysis of the lower jaw. Height of the body is contained 5½ times in the total length, and the

length of the head $4\frac{1}{3}$ times in the same. Snout shorter than the eye. Interorbital space flat, and its width equals the diameter of the eye; the latter is one-third of the length of the head. Origins of the dorsal and anal fins opposite to each other; dorsal high and pointed; the anterior rays, when laid backward, reach to the caudal fin. Anal very low. Lower caudal lobe longer than the head. Length of the pectoral is one-half of the total length, reaching nearly to the middle of the dorsal fin. Ventrals extend to the anal, and are inserted midway between the snout and the root of the caudal fin. The upper part of the dorsal is black; pectorals blackish, anals and ventrals whitish.

Total lengths, 6.00, 6.50 inches.

Locality: Hawaiian Islands.

SCOPELIDÆ.

SAURIDA NEBULOSA, *Cuv. & Val.* [No. 15392].

Saurida nebulosa, CUV. & VAL., Hist. Nat. des Poiss., xxii, 1849, 504, pl. 649.—BLEEKER, Nat. Tyds. Ned. Ind., iii, 1852, 292.—GÜNTHER, Cat. Fish., v, 1864, 399.—KLUNZINGER, Verh. zoöl.-bot. Ges., xxi, 1871, Fische d. Roth. Meer, 591.

D. 11. A. 9–10. L. lat. 52.

In the older specimens the spots are more or less aggregated, those on the sides of the body forming transverse bands extending to below the lateral line.

Locality: Honolulu, Oahu.

MURÆNIDÆ.

MURÆNA UNDULATA, (*Lacep.*) *Gthr.* [No. 17982].

Muræophis undulata, LACEP., Hist. des Poiss., v. 1803, 629–644.

Muræna cancellata, RICHARDSON, Voy. Ereb. and Terr., Fish., 1848, 87, pl. 46, f. 1–5.—BLEEKER, Verh. Bat. Gen., xxv, 1853, *Mur.*, 74; Nat. Tyds. Ned. Ind., v. 1853, 1853, 531; viii, 1855, 326.

Muræna valenciennii, EYD. & SOUL., Voy. Bonite, Poiss., 207, pl. 8, f. 1.

Muræna agassizi, BLEEKER, Nat. Tyds. Ned. Ind., viii, 1855, 458.

Myrsoidea cancellata, KAUP, Apod. Fish., 1856, 76, f. 59.

Gymnothorax cancellatus, BLEEKER, Atl. Ichth., iv, 1864, *Mur.*, 93, pl. 32, f. 3, pl. 33, f. 2, pl. 39, f. 1.—KNER, Novara Exped., Fisch., 1869, 384.

Gymnothorax agassizi, BLEEKER, Atl. Ichth., iv, 1864, *Mur.*, 95, pl. 41, f. 2.

Gymnothorax blochi, BLEEKER, Atl. Ichth., iv, 1864, *Mur.*, 102, pl. 36, f. 2 (young).

Muræna blochi, BLEEKER, Verh. Bat. Gen., xxv, 1853, *Mur.*, 49; Nat. Tyds. Ned. Ind., vii, 1854, 102.

Muræna undulata, GÜNTHER, Cat. Fish., viii, 1870, 110.

Locality: Coral reefs at Honolulu, Oahu.

One specimen resembling Bleeker's figure 3, on plate 32 of Atlas. In another specimen the yellow lines are more interrupted and less distinctly defined, as is shown in figure 1, plate 39, of the same work.

GALEORHINIDÆ.

TRIAKIS SEMIFASCIATA, *Girard* [No. 17975].

Triakis californica, GRAY, Chondropter., 56 (No descr.).

Triakis semifasciatum, GIRARD, Proc. Acad. Nat. Sci. Phila., 1854, 196; U. S. Pac. R. R. Rep., x, 1858, Fish., 362.

Mustelus felis, AYRES, Proc. Cal. Acad. Nat. Sci., 1854, 17.

Triacis semifasciata, GÜNTHER, Cat. Fish., viii, 1870, 384.

A row of rounded black spots along the sides of the body, alternating with transverse bands, which unite across the median line of the back. Also small round black spots between the cross-bars on the median line of the back, and others alternating with the larger spots on the sides.

Locality: North Pacific Ocean. Fœtus. The specimens were obtained in Honolulu, whither they had been brought by a whaler.

III.—Fishes of the Fanning Group.

TETRODONTIDÆ.

TETRODON IMPLUTUS, *Jenyns** [No. 19214].

Locality: Palmyra and Christmas Islands.

Specimens large, and sparsely spinous. Round bluish-white spots on the dorsal regions numerous, and the longitudinal lines on the under surface indistinct.

TETRODON NIGROPUNCTATUS, *Bl. Schn.* [No. 19215].

Tetrodon nigropunctatus, BLOCH, Syst. Ichth., ed. SCHN., 1801, 507.—GÜNTHER, Cat. Fish., viii, 1870, 293.—KLUNZINGER, Verh. zoöl.-bot. Ges., xxi, 1871, Fische d. Roth. Meer, 643.

Tetraodon diadematus, RÜPPELL, Atl. Fisch., 1828, 65, pl. 17, f. 3.—GÜNTHER, Cat. Fish., viii, 1870, 293.

Tetrodon trichoderma, BLEEKER, Nat. Tyds. Ned. Ind., v, 1853, Sumatra, 532.

Tetrodon trichodermatoides, BLEEKER, Nat. Tyds. Ned. Ind., vi, 1854, Flores, 336.

Arothron melanorhynchus, BLEEKER, Nat. Tyds. Ned. Ind., ix, 1855, 111.

Arothron trichoderma, BLEEKER, Enum. Pisc. Arch. Ind., 1859, 201.

Arothron trichodermatoides, BLEEKER, Enum. Pisc. Arch. Ind., 1859, 202.

Crayracion nigropunctatus, BLEEKER, Atl. Ichth., v, 1865, *Gymnod.*, 74, pl. 2, f. 4.

Locality: Fanning Group.

This specimen belongs to what Günther calls *citrinella*, a variety of *nigropunctatus*. It is characterized by its lemon color, with small scattered black spots on the sides, and large and small irregular black spots

Ostracion cyanurus, RÜPPELL, Atl. Fische, 1828, 4, pl. 1, f. 2.—HOLLARD, Ann. Sc. Nat., 1857, vii, 167.

Ostracion argus, RÜPPELL, op. cit., pl. 1, f. 1.

Ostracion immaculatus, SCHLEG., Faun. Japon. Poiss., 1850, 296.—BLEEKER, Verh. Bat. Gen., xxv, 1853, Nat. Ichth. Japan, 55.

Ostracion tesserula, BLEEKER, Nat. Tyds. Ned. Ind., iii, 1852, 305 (young).

Carapace four-ridged, without spines. Body with bluish black-edged ocelli, one in the center of each scute.

Locality: Fanning Group.

BALISTIDÆ.

BALISTES ACULEATUS, *Linn.* [No. 19217.]

Balistes aculeatus, LINN., Syst. Nat., i, 1766, 406.—BLOCH, Ausländ. Fisch., ii, 1786, 19 pl. 149.—BLOCH, Syst. Ichth., ed. SCHN., 1801, 465.—LACÉP., Hist. des Poiss., i, 1798, 367, pl. 17, f. 1.—BENNETT, Beechey's Voy. Zoöl., 1839, 69, pl. 22, f. 2.—JENYNS, Zoöl. Beagle, Fish., 1842, 155.—BLEEKER, Verh. Bat. Gen., xxiv, 1852, *Balist.*, 15.—HOLLARD, Ann. Sc. Nat., i, 1855, 333.—GÜNTHER, Cat. Fish., viii, 1870, 223.

Balistes ornatissimus, LESSON, Voy. Coq. Zoöl. Poiss., i, 1830, 119, pl. 10, f. 1.

Balistes armatus, CUV., Règne Anim. Ill. Poiss., 1829–'30, pl. 112, f. 2.

Balistes striatus, GRONOV., Syst. (1780), ed. GRAY, 1854, 32.

Balistes (*Balistapus*) *aculeatus*, BLEEKER, Atl. Ichth., v, 1865, 120, pl. 216, *Balist.*, pl. 2, f. 3.

Locality: Fanning Group.

PLEURONECTIDÆ.

RHOMBOIDICHTHYS LEOPARDINUS, *Gthr.* [No. 19218].

Rhomboidichthys leopardinus, GÜNTHER, Cat. Fish., iv, 1862, 43.

The posterior half of the lower eye falls vertically below the upper; the interorbital space concave, its width equaling the longitudinal diameter of the eye, and scaly only on its posterior half; anterior half naked. Brownish spots, and blue-edged ocelli scattered over the body and fins.

Locality: Fanning Group.

This species is very closely allied to *R. pantherinus*, but it may readily be distinguished by the naked anterior-half of the interocular space, and by the scattered ocelli. Günther records it without a habitat, and this is the first instance, to our knowledge, where a locality has been assigned to it.

BLENNIIDÆ.

SALARIAS QUADRICORNIS, *Cuv. & Val.* [No. 19219].

Salarias quadricornis, CUV. & VAL., Hist. Nat. des Poiss., xi, 1836, 329, pl. 329.—GÜNTHER, Cat. Fish., iii, 1861, 255.—KLUNZINGER, Verh. zoöl.-bot. Ges., xxi, 1871, Fische d. Roth. Meer, 476.

D. 12 | 20. A. 21–23. V. 2.

Dorsal notched, and continued on the base of the caudal. Head crested. Tentacles over the eyes, on the sides of the neck, and at the nostrils; the latter are fringed the former are as long as the eye and those on the neck are very short. Transverse streaks arranged in pairs on the sides of the body and ascending on the dorsal fin at its base; spinous dorsal with undulating lines; the soft dorsal with oblique lines ascending backward; the anal with three fine lines, the lowest of which is discontinued anteriorly. The anterior dorsal is lower than the posterior, and both are lower than the body and higher than the anal.

Locality: Fanning Group.

SCARIDÆ.

PSEUDOSCARUS GLOBICEPS, (*Cuv. & Val.*) *Gthr.* [No. 19220].

Scarus globiceps, CUV. & VAL., Hist. Nat. des. Poiss., xiv, 1839, 242.—JENYNS, Voy. Beagle, Fishes, 1842, 106.

Pseudoscarus globiceps, GÜNTHER, Cat. Fish., iv, 1862, 224; Fish. Zanz., 1866, 105.

Pseudoscarus spilonotus, KNER, Sitz. d. k. Ak. d. Wissen. Wien, lviii, i, 1868, 31, 352, pl. 9, f. 26.

Color (in spirits) greenish-olive, yellowish about the mouth. A broad irregularly-outlined band across the snout, and from its extremities there passes backward a prolongation which touches the anterior margin of the orbit, and then passes along the superior border of the eye to the posterior part of the interorbital space, where it joins with its fellow of the opposite side, inclosing an irregularly-shaped triangular space on the front of the interocular region. Frequently (in smaller specimens) there is a narrow dark streak from the superior border of the orbit toward the middle of the interorbital space; this streak is sometimes reduced to rounded spots in the same situation; a short streak from the middle of the posterior margin of the eye; a band below the eye, commencing near its anterior edge, and prolonged beyond the posterior margin. Frequently two ocelli, one on either side, in front of the band on the snout, and also one behind and above the angle of the mouth; a very narrow band around the margin of the upper lip; a broad band around the lower jaw, the two halves of which scarcely meet below in the median line; it broadens above, just below the angle of the mouth, where it is directed backward; it frequently arches downward and backward in this situation. It coalesces with the narrow supramaxillary band, and in some instances a narrow band passes from it to the band across the snout. Occasionally there is an ocellus on the lower jaw, behind the marginal band. Dorsal and anal fins with a narrow band along the margin, and with one or two rows of intermarginal spots. Frequently (in young specimens) these spots are confluent transversely or longitudinally, forming either vertical streaks or longitudinal bands. Caudal with reticulating transverse bands.

Lengths, 14, 12, 11 inches.

Locality: Palmyra Island.

To William H. Jones, M. D., Surgeon, U. S. N., an indefatigable collector in natural history, and to whose zeal we are chiefly indebted for this collection, I dedicate this species, in remembrance of pleasant hours passed together as collaborers, and as messmates.

PSEUDOSCARUS ÆRUGINOSUS, *Blkr.* [No. 19221].

[1] *Scarus æruginosus*, CUV. & VAL., Hist. Nat. des Poiss., xiv, 1839, 257.

Scarus laeerta, CUV. & VAL., op. cit., 217.

Scarus æruginosus, BLEEKER, Ver. Bat. Gen., xxii, 1849, *Labr.*, *Cycl.*, 58.

Pseudoscarus æruginosus, BLEEKER, Atl. Ichth., i, 1862, *Labr.*, 40, pl. 17, f. 2—GÜNTHER, Cat. Fish., iv, 1862, 229.

Color (in spirits) greenish on the sides of the body and head, brown-

ish above, along the back and head; three silvery longitudinal ban along the side of the abdomen; the first commencing at the lower pa of the base of the pectoral fin; the third above the base of the ventra extending to the anal fin. Fins reddish; spinous dorsal with a ve narrow darker margin.

Lengths, 8, 8, 5.50 inches.

Locality: Fanning Islands.

LABRIDÆ.

CHEILINUS UNIFASCIATUS, n. sp. [No. 19222].

D. $\frac{9}{10}$. A. $\frac{3}{8}$. L. lat. 22. L. trans. $9\frac{1}{2}$.

Height of the body three and a half times in the total length, a the length of the head from three to three and one-fifth times the same. Snout elongated, conical, lower jaw projecting. Diame of the eye is one-third the length of the snout, and one-half t width of the præorbital; the center of the pupil is midway between t angle of the operculum and the point of the snout. The anterior bules of the lateral line with a single lateral branch. Two rows of sca on the cheeks; the lower series does nòt cover the inferior præopercu limb. Caudal fin rounded, with the upper and lower lobes very sligh produced. Body reddish (in spirits), with branching lines passing fr the eye over the snout; anastomosing lines on the cheeks, extending the margins of the sub- and inter-operculum; a yellowish streak fr the inferior border of the orbit to the superior axil of the pectoral f and above this another streak, similar but somewhat fainter outlin

[redacted]

JULIS UMBROSTIGMA, *Rüpp.* [No. 19223].

Julis umbrostigma, RÜPPELL, N. W. Fische, ii, 1837, pl. 3, f. 2.—BLEEKER, Atl. Ichth., i, 1862, 92, pl. 34, f. 2.—GÜNTHER, Cat. Fish., iv, 1862, 185.—KNER, Fische Novara Exped., 1869, 257.—KLUNZINGER, Verh. zoöl.-bot. Gesel., xxi, 1871, Fische d. Roth. Meer, 538.
Julis souleyeti, CUV. & VAL., Hist. Nat. des Poiss., xiii, 1839, 457.

Body with small blackish vertical streaks on the scales; spots scattered over the head; three or four short streaks from the upper and posterior portion of the orbit; a pair of short streaks between the eyes, and two on the upper surface of the snout; a single round spot between the two pairs; an oblique streak on each side of the snout, parallel with the upper lip; another, and shorter, streak on the side of the snout, extending downward from before the eye and coalescing with the extremity of the first. Dorsal with a black spot anteriorly between the first and third spines.

Locality: Fanning Islands.

JULIS GÜNTHERI, *Bleeker* [No. 19224].

Julis quadricolor, BLEEKER, Act. Soc. Sc. Indo-Nederl., i, 1856, Manad., 55.
Julis güntheri, BLEEKER, Versl. Akad. Wet. Amst., xiii, 1862, 279; Atl. Ichth., i, 1862, *Labr.*, 94, pl. 34, f. 1.—GÜNTHER, Cat. Fish., iv, 1862, 188.

Three specimens similar in every particular, and agreeing with descriptions.

Two longitudinal denticulated bands on the sides of the body—one running from the nape of the neck, just above the anterior portion of the lateral line, to the extremity of the upper caudal lobe; the second commencing behind the angle of the operculum and extending to the middle of the caudal fin. Two curved bands on the sides of the head—one from the upper jaw, through the eye, to the angle of the operculum; the other from the under surface of the lower jaw, along the inferior border of the eye, to opposite the base of the pectoral fin; a U-shaped band across the occiput, pointing backward and downward; two slightly arched bands between the eyes, from the antero-superior and postero-superior margins, inclosing the interocular space; sometimes the extremities of these bands are united through the superior edge of the eye, forming a ring around the interorbital region; in one instance a third band crossed the center of the space between the eyes; an oblique band on the breast below the base of the pectoral fin. Dorsal fin with a black spot anteriorly; the fin with a dark margin; anal uni-

formly colored. The tip of the pectoral fin black; a black spot on the upper part of the base.

In one specimen short vertical streaks pass from one longitudinal band to the other on the sides.

Lengths, 5.50, 5.00, 4.50 inches.

Locality: Fanning Islands.

JULIS MELANOCHIR, *Bleeker*. [No. 19225].

Julis melanochir, BLEEKER, Act. Soc. Sc. Indo-Nederl., ii, 1857, Amboina viii, p. [illegible]7 Atl. Ichth. i, 1862, *Labr.*, 89, pl. 33, pl. 2.—GÜNTHER, Cat. Fish., iv, 1862, 18[illegible]

Head violet, with two narrow blue black-edged lines on the sides; one extending from the posterior border of the eye to the point of the operculum; the other from the angle of the mouth to the junction of the sub- and inter-operculum. Body green. Dorsal fin with a light edge and a dark intramarginal line; anal with a light margin. A rounded, transverse black spot across the posterior border of the pectoral fin; a black spot in the axil above.

Locality: Fanning Islands.

JULIS LUNARIS, (*L.*) *Cuv. & Val.* [No. 19226].

Labrus lunaris, LINN., Syst. Nat. i, 1766, 474.
Scarus gallus, FORSK., Descr. Anim., 1775, 26.
Labrus viridis, BLOCH, Ausländ. Fische, v, 1786, 129, pl. 232.
Julis porphyrocephala, BENNETT, Proc. Comm. Zoöl. Soc., ii, 183.
Julis duperrei, QUOY & GAIM., Voy. Uran. Zoöl., 1824, 268, pl. 56, f. 2.
Julis lunaris, CUV. & Val., Hist. Nat. des Poiss., xiii, 1839, p. 409.—BLEEKER, Verh. Bat. Gen., xxii, 1849, *Labr.*, 28; Atl. Ichth., i, 1862, *Labr.*, 90, pl. 33, f. 5.—GÜNTHER, Cat. Fish., iv, 1862, 180; Fish. Zanz., 1866, 97.—KNER, Fische No-

JULIS ANEITENSIS, *Gthr.* [No. 19227].

Julis aneitensis, GÜNTHER, Cat. Fish, iv, 1862, 183.

Height equals the length of the head, and one-fourth of the total length (caudal lobes not included). Colors (in spirits), bluish on the shoulder; no light cross-band behind the pectorals; bands on the side of the head; two behind the eye, the upper extending to the origin of the lateral line, and the second from the middle of the posterior border of the eye to the point of the operculum; a third from above the angle of the mouth, across the lower border of the eye, to opposite the base of the pectoral fin; a curved band on the cheek below the eye, commencing on the edge of the suboperculum, turning upon itself behind the angle of the mouth, and terminating on the interoperculum. Body, greenish; each scale with a vertical streak. A broad oblique black band across the posterior half of the pectoral fin, and a black spot in the axil above. Dorsal fin with a broad light margin, and an intramarginal band, edged with a fine black line above and below; the lower line is very near the base of the fin; a black spot anteriorly on the dorsal between the second and third spines. Anal light colored, base dark; the dark portion limited by a fine black line similar to those on the dorsal.

Locality: Fanning Islands.

This species is apparently very closely allied to *Julis hebreica*, and is probably an eastern representative of that species.

GOMPHOSUS UNDULATUS, n. sp. [No. 19228].

D. $\frac{8}{13}$. A. $\frac{2}{11}$. L. lat. 27. L. trans. $\frac{3}{9}$.

Height of the body 4½ times in the total length, and the length of the head 2¼ times in the same. Caudal fin truncated; lobes very slightly produced. Color in spirits: Head brownish-olive; a broad irregular band from the snout through the lower part of the eye to the operculum. Body glaucous-olive, lighter on the breast, and with a vertical purplish streak at the base of each scale on the sides. Dorsal and anal fins with narrow transparent margins; the former with a median row of irregularly-shaped light spots; the other portion of the fin purplish; from the upper margin of the purple portion slender, tooth-like streaks extend upward into the transparent margin between the rays. Anal with a narrow purplish band along the base, with its margin dentated; a band of the same color along the center, the upper margin of which is scalloped, and from the lower margin are tooth-like streaks similar to

those on the dorsal. A blackish transverse streak across the posterior part of the pectoral fin, and a black spot above on the base.

Length, 9 inches.

Locality: Fanning Islands.

Allied to *G. varius*, the principal difference between them being the markings on the vertical fins.

POMACENTRIDÆ.

GLYPHIDODON SEPTEMFASCIATUS, (*C. & V.*) *Gthr.* [No. 19229].

Glyphisodon septemfasciatus, Cuv. & Val., Hist. Nat. des Poiss., v, 1830, 463.—Bleeker, Nat. Tyds. Ned. Ind., iii, 1852, Sumatra, i, 582.

Glyphidodon septemfasciatus, Günther, Cat. Fish., iv, 1862, 40.

D. $\frac{13}{12-13}$. A. $\frac{2}{12-13}$. L. lat. 29. L. trans. $\frac{3}{11}$.

Scales between the eyes do not reach as far forward as the anterior border of the orbit. Seven transverse bands on the side of the body, broader than the spaces between them; the first and second band situated in front of the commencement of the spinous dorsal fin; third, fourth, and fifth bands under the spinous dorsal; sixth under the soft dorsal; seventh on the caudal peduncle behind the dorsal and anal fins. Upper half of the spinous dorsal blackish; caudal lobes tipped with black.

Locality: Palmyra Island.

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ACANTHURIDÆ.

ACANTHURUS BLOCHI, *C. & V.** [No. 19231].

Locality: Fanning Islands. All old specimens.

ACANTHURUS TRIOSTEGUS (*L.*) *Bl. Schn.* [No. 19232].

Chætodon triostegus, LINN., Syst. Nat., i, 1766, 463.

Acanthurus triostegus, BLOCH, Syst. Ichth., ed. SCHN., 1801, 215.—CUV. & VAL. Hist. Nat. des Poiss., x, 1835, 197.—BLEEKER, Verh. Bat. Gen., xxiii, 1850, *Teuth.*, 13.—JENYNS, Voy. Beagle, Fishes, 1842, 75.—GÜNTHER, Cat. Fish., iii, 1861, 337; Jour. Mus. Godeff., ii, 1875, Fische der Sudsee, i, 108.

Harparus fasciatus, FORST., Descr. Anim., ed. LICHT., 1844, 216.

Acanthurus zebra, LACÉP, Hist. des Poiss., iv, 1803., 546, pl. 6, f. 2.

Chætodon zebra, LACÉP., op. cit., iii, pl. 25, f. 3.

Chætodon couagga, LACÉP., op. cit., iv, 727.

Acanthurus hirudo, BENNETT, Fish. of Ceylon, 1834, 11, pl. 11.

Locality: Fanning Islands.

ACANTHURUS ACHILLES, *Shaw* [No. 19233].

Acanthurus achilles, SHAW, Zoöl., iv, 1803, 383.—CUV. & VAL., Hist. Nat. des Poiss., x, 1835, 218.—GÜNTHER, Cat. Fish., iii, 1861, 340; Jour. Mus. Godeff, ii, 1875, Fische der Sudsee, i, 115, pl. 71, f. B.

$$D. \frac{9}{30-31}. \quad A. \frac{2}{28}.$$

Color (in spirits) blackish-brown; a large triangular spot, with a rounded base, on the posterior part of the side of the body, with the apex of the triangle embracing the lateral spine (spot red in life); a narrow bluish margin to the dorsal and anal fins; a narrow band along the base of each (red in life); a blue band around the lower jaw; the subopercular margin with a white spot (blue in life); and the outer rays of the ventral fins blue; margin of the caudal fin white; a crescent across the middle portion of the latter separated from the light margin by a narrow brown band.

Locality: Fanning Islands.

* See synonymy under Hawaiian Fishes.

CHÆTODONTIDÆ.

CHÆTODON SETIFER, *Bl.* [No. 19234].

Chætodon setifer, BLOCH, Naturg. ausländ. Fische. 1797, pl. 426, 1.—BLOCH, Syst. Ichth., ed. SCHN., 1801, 225.—CUV. & VAL., Hist. Nat. des Poiss., vii, 1831, 76.—GÜNTHER, Cat. Fish., ii, 1860, 6; Jour. Mus. Godeff., ii, 1874, Fische der Sudsee, i, 36, pl. 26, f. B.

Pomacentrus filamentosus, LACÉP., Hist. des Poiss., iv, 1803, 506, 511.

Chætodon sebonus, CUV. & Val., op. cit., 74.

Chætodon auriga, var. RÜPPELL, N. W. Fische, 1837, 28.

Chætodon lunaris, GRONOV., Syst. (1780), ed. GRAY, 1854, 70.

Chætodon auriga, BLEEKER, Nat. Tyds. Ned. Ind., v, 1853, Celebes, iv, 164.

Locality: Fanning Islands.

CARANGIDÆ.

CARANGUS ASCENSIONIS, (*Forst.*) *Streets* [No. 19235].

Scomber ascensionis, FORSTER, Descr. Anim., ed. LICHT., 1844, 412.—BLOCH, Syst. Ichth., ed. SCHN., 1801, 33.

Caranx ascensionis, CUV. & VAL., Hist. Nat. des Poiss., ix, 1833, 102, pl. 249.—GÜNTHER, Cat. Fish., ii, 1860, 432; Jour. Mus. Godeff., 1876, part xi, Fische der Sudsee, part v, 132, pl. 85.

D $8\frac{1}{21}$. A. $2\frac{1}{17}$. L. lat. (plates) 30.

The height of the body is one-third of the total length (without caudal); head higher than long; its length is contained 3[illegible] times in the tot[illegible]

CHORINEMUS SANCTI PETRI, *Cuv. & Val.** [No. 19236].

Adult specimens, 18–19 inches long. Two rows of blackish round spots on the sides, one above and the other below the lateral line; a blackish streak from above the eye to the shoulder, above the base of the pectoral fin. Top of the dorsal fin black; a black spot on the anal anteriorly.

Locality: Christmas Island. Abundant. Swim near the surface of the water.

MULLIDÆ.

MULLOIDES FLAVOLINEATUS, (*Lacép.*) *Blkr.* [No. 19237].

Mullus flavolineatus, LACÉP., Hist. des Poiss., iii, 1803, 406.

Mullus aureovittatus, SHAW, Zoöl., iv, 1803, 618.

Upeneus flavolineatus, CUV. & VAL., Hist. Nat. des Poiss., iii, 1829, 456.—RÜPPELL, N. W. Fische, 1837, 101, pl. 26, f. 1.—JENYNS, Zoöl. Beagle, Fish., 1842, 24.

Mulloides flavolineatus, BLEEKER, Nat. Tyds. Ned. Ind., iii, 1852, Ceram, ii, 697.—GÜNTHER, Cat. Fish., i, 1859, 403; Jour. Mus. Godeff., ii, 1873, Fische der Sudsee, i, 56.

A broad yellow band below the middle of the body from the operculum to to the tail; yellow lines on the snout; fins without spots.

Length, 11 inches.

Locality: Fanning Islands.

BERYCIDÆ.

HOLOCENTRUM SPINIFERUM, (*Forsk.*) *Gthr.* [No. 19238].

Sciæna spiniferum, FORSK., Descr. Anim., 1775, 49.

Perca spiniferum, BLOCH, Syst. Ichth., ed. SCHN., 1801, 86.—LACÉP., Hist. des Poiss., iv, 1803, 418.

Holocentrum leo, CUV. & VAL., Hist. Nat. des Poiss., iii, 1829, 204.—LESSON, Voy. Coq., ii, 1830, 222.—QUOY & GAIM., Voy. Astrol. Poiss., 1834, 678, pl. 14, f. 3.—CUVIER, Règne Anim. Ill., pl. 14, f. 1.—BLEEKER, Nat. Tyds. Ned. Ind., vii, 1854, Kokos-eil., 355.

Holocentrus spinifer, RÜPPELL, N. W. Fische, 1837, 96, pl. 25, f. 1.

Holocentrum spiniferum, GÜNTHER, Cat. Fish., i, 1859, 39; Jour. Mus. Godeff., ii, 1874, Fische der Sudsee, i, 94.

The profile of the head concave; snout pointed, longer than the diameter of the eye; the end of the maxillary extends to under the anterior portion of the eye. Posterior border of the præoperculum oblique, dentated, the long spine at the angle longer than one-half of the

* See synonymy under Hawaiian Fishes.

posterior border; two flat opercular spines, the upper the larger; margin serrated; suboperculum entire; interoperculum serrated above only; scapular dentated. The third anal spine as long as the longest dorsal spine. Color, red.

Locality: Fanning Islands.

PRISTIPOMATIDÆ.

APHAREUS FURCATUS, (*Lacép.*) *Gthr.* [No. 19239].

Labrus furcatus, LACÉP., Hist. des Poiss., iii, 1803, 424, 477, pl. 21, f. 1.

Caranxamorus sacrestinus, LACÉP., op. cit., v, 1803, 682.

Aphareus cœrulescens, CUV. & VAL., Hist. Nat. des Poiss., vi, 1830, 487, pl. 167*b*.

Aphareus furcatus, GÜNTHER, Cat. Fish., i, 1859, 386; Jour. Mus. Godeff., ii, 1873, Fische der Sudsee, i, 17.

D. $\frac{10}{11}$. A. $\frac{3}{8}$. L. lat. 76. L. trans. $\frac{8}{18}$.

The third dorsal spine is the longest. The last ray of the dorsal and anal fins is three times as long as the preceding rays.* Brown (in spirits). darker above the lateral line; head brownish-blue.

Length, 13 inches.

Locality: Fanning Islands.

LUTJANUS LINEATUS, (*Q. & G.*) *Streets* [No. 19240].

Diacope lineata, QUOY & GAIMARD, Voy. Freyc., Zoöl., 1824, 309.

Diacope striata, CUV. & VAL., Hist. Nat. des Poiss., ii, 1828, 430.

Mesoprion striatus, BLEEKER, Verh. Bat. Gen., xxii, 1849, *Percidæ*, 44.

Mesoprion janthinuropterus, BLEEKER, Nat. Tyds. Ned. Ind., iii, 1852, Celebes, iii, 751.

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SERRANIDÆ.

EPINEPHELUS URODELUS, (*Forst.*) *Bleeker* [No. 19241].

Perca urodela, FORSTER, Descr. Anim., ed. LICHT., 1844, 221.

Serranus urodelus, CUV. & VAL., Hist. Nat. des Poiss., ii, 1828, 306; vi, 1830, 513.—BLEEKER, Nat. Tyds. Ned. Ind., vii, 1854, Kokos-eil., 39.—GÜNTHER, Cat. Fish., i, 1859, 122; Jour. Mus. Godeff., ii, 1873, Fische der Sudsee, i, p. 3, pl. 3, f. A.

$$D. \frac{9}{14-15}. \quad A. \frac{3}{8-9}.$$

Uniform brown (in spirits). The posterior part of the dorsal and anal, and caudal fins, with white spots; a narrow black margin to the soft dorsal and anal, and a submarginal band of white; caudal with two oblique white lines, converging posteriorly.

Locality: Fanning Islands.

EPINEPHELUS ARGUS, (*Bl. Schn.*) *Bleeker* [No. 19242].

Bodianus guttatus, BLOCH, Ausländ. Fische, vii, 1797, pl. 224.—BLOCH, Syst. Ichth., ed. SCHN., 1801, 330.

Cephalopholis argus, BLOCH, Syst. Ichth., ed. SCHN., 311, pl. 61.

Serranus myriaster, CUV. & VAL., Hist. Nat. des Poiss., ii, 1828, 365.—RÜPPELL, Atlas Fische, 1828, 107, pl. 27, f. 1.—LESSON, Voy. Coq. Poiss., 1830, pl. 37.

Serranus argus, CUV. & VAL., op. cit., ii, 1828, 360.—GÜNTHER, Cat. Fish., i, 1859, 115.

Serranus guttatus, PETERS, Arch. f. Naturg., 1855, i, 235.—GÜNTHER, op. cit., i, 1859, 119; Jour. Mus. Godeff., ii, 1873, Fische der Sudsee, i, 5, pl. 4. (non CUV. & VAL.)

$$D. \frac{9}{15-16}. \quad A. \frac{3}{9}.$$

Brownish-black; head, body and, fins covered with round blue black-edged spots; more or less distinctly-marked transverse bars across the posterior portion of the body; the soft portion of the dorsal, the anal, the pectoral, and the caudal fins with narrow white margins; the upper half of the membrane, between the dorsal spines, light colored.

Locality: Christmas Island.

The name *guttatus* cannot be retained for this species, as an Atlantic species, the *Perca guttata*, Gmelin (=*Epinephelus guttatus*, Goode), has a prior claim to it.

EPINEPHELUS HEXAGONATUS, (*Bl. Schn.*) *Bleeker*. [No. 19243].

Holocentrus hexagonatus, BLOCH, Syst. Ichth., ed. SCHN., 1801, 323.

Serranus hexagonatus, CUV. & VAL., Hist. Nat. des Poiss., ii, 1828, 330; vi, 1830, 516.—RICHARDSON, Voy. Sulph., 1844, 82, pl. 38, f. 1.—BLEEKER, Nat. Tyds. Ned. Ind., vi, 1854, 191.—GUNTHER, Cat. Fish., i, 1859, 140; Jour. Mus. Godeff., ii, 1873, Fische der Sudsee, i, 7, pl. 7.

Serranus foveatus, CUV. & VAL., op. cit., ii, 1828, 329.

Serranus stellans, RICHARDSON, Ann. Nat. Hist., 1842, ix, 23.

Perca hexagonata, FORSTER, Descr. Anim., ed. LICHT., 1844, 189.

D. $\frac{11}{15-16}$. A. $\frac{3}{8}$.

Brownish; covered all over with hexagonal spots, separated by white lines; four large dark brown blotches on the back along the base of the dorsal fin.

Locality: Christmas Island.

VARIOLA LOUTI, (*Forsk.*) *Bleeker*. [No. 19244.].

Perca louti, FORSKÅL, Descr. Anim., 1775, 40.

Labrus punctatus, LACÉP., Hist. des Poiss., iii, 1803, 377, pl. 17, f. 2.

Bodianus louti, BLOCH, Syst. Ichth., ed. SCHN., 1801, 332.—LACÉP., op. cit., iv, 1803, 286.

Serranus punctulatus, CUV. & VAL., Hist. Nat. des Poiss., ii, 1828, 367; ix, 1833, 435.

Serranus louti, RÜPPELL, Atlas Fische, 1828, 106, pl. 26, f. 2.—GÜNTHER, Cat. Fish., i, 1859, 101; Jour. Mus. Godeff., ii, 1873, Fische der Sudsee, i, 2, pl. 1 (non Val).

Variola longipinna, SWAINSON, Nat. Hist., ii, 1839, 202.

Pseudoserranus louti, KLUNZINGER, Fische d. Roth. Meer, 687.

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MUGILIDÆ.

MUGIL CRENILABRIS, *Forskål* [No. 19246].

Mugil crenilabris, FORSKÅL, Descr. Anim., 1775, 73.—RÜPPELL, N. W. Fische, 1837, 132.—CUV. & VAL., Hist. Nat. des Poiss., xi, 1836, 123.—GÜNTHER, Cat. Fish., iii, 1861, 458.

Mugil rüppelli, GÜNTHER, Cat. Fish., iii, 1861, 458.

D $4\frac{1}{8}$. A $\frac{3}{9}$. L. lat. 38–40. L. trans. 14.

Height of the body is contained $4\frac{1}{2}$ times in the total length, and the length of the head 5 times in the same. Snout broad, short—less than the diameter of the eye—obtuse; the interorbital space slightly convex, its width being double the vertical diameter of the eye, and contained $2\frac{1}{4}$ times in the length of the head. The upper lip is thick, with short, fleshy fringes; the lower jaw also fringed, and notched at the symphysis; the mandibulary bones do not leave any free space between them below; the præorbital notched anteriorly, and toothed posteriorly; the extremity does not entirely cover the end of the maxillary. Eyes without an adipose membrane. The second dorsal and anal fins scaly; the anterior dorsal spines one-half the length of the head. Caudal forked. The eleventh, the twelfth, and the twenty-third scales of the lateral line correspond to the extremity of the pectoral, and to the origins of the first and second dorsal fins. Sides silvery, darker along the back; a black spot superiorly in the axil of the pectoral.

Length, 6 inches.

Locality: Lagoons of Christmas Island.

MURÆNIDÆ.

MURÆNA PICTA, *Ahl* [No. 19247].

Muræna picta, J. N. AHL, de *Muræn. et Ophichth.*, in Thunberg's Dissert., iii, 1793, 6, pl. 2, f. 2.—PLAYFAIR & GÜNTHER, Fish. Zanz., 1866, 126.—GÜNTHER, Cat. Fish., viii, 1870, 116.

Gymnothorax pictus, BLOCH, Syst. Ichth., ed. SCHN., 1801, 529.—BLEEKER, Atl. Ichth., iv, 1864, 87, pl. 170, f. 3, 4, pl. 172, f. 3, pl. 173, f. 1, pl. 189, f. 3.—KNER, Fisch. Novara Exped., 1869, 384.

Muræophis pantherina, LACÉPÈDE, Hist. des Poiss., v, 1803, 628, 641, 643.

Muræna variagata, QUOY & GAIMARD, Voy. Uran., Poiss., 1824, pl. 52, f. 1.

Muræna lita, RICHARDSON, Zoöl. Voy. Ereb. & Terr., Fish., 1846, 84.—BLEEKER, Nat. Tyds. Ned. Ind., iii, 1852, 294; x, 1856, 283; Verh. Bat. Gen., xxv, 1853, *Muræn.*, 47.

Muræna videra, RICHARDSON, op. cit., 85, pl. 48, f. 1–5.

Muræna pfeifferi, BLEEKER, Nat. Tyds. Ned. Ind., v, 1853, 173; Verh. Bat. Gen., xxv, 1853, *Muræn.*, 72.

Sidera pfeifferi, KAUP, Cat. Apod. Fish., 1856, 71.

Sidera pantherina, KAUP, op. cit., 1856, 71.

Gymnothorax pantherinus, BLEEKER, Ned. Tydschr. Dierk., i, 1863, 152.

Locality: Palmyra Island. The collection contains many specimens, illustrating all the variations of color-markings of this variable species. All the teeth, except the anterior mandibulary, are uniserial in their arrangement. One specimen, six inches long, presents all the details of coloration of *Muræna polyophthalma*, but differs from it in its dentition.

GALEORHINIDÆ.

CARCHARIAS MELANOPTERUS, *Q. & G.* [No. 19248].

Carcharias melanopterus, QUOY & GAIMARD, Voy. Uran. Zoöl., 1824, 194, pl. 43, f. 1-2.—RÜPPELL, N. W. Fische, 1837, 63.—GÜNTHER, Cat. Fish., viii, 1870, 369.

Carcharias (Prionodon) melanopterus, MÜLLER & HENLE, 43, pl. 19, f. 5.—BLEEKER, Verh. Bat. Gen., xxiv, 1852, *Plag.*, 33.—DUMERIL, Elasmobr., 365.

Carcharias (Prionace) melanopterus, CANTOR, Mal. Fish., 400.

Carcharias (Prionodon) henlei, BLEEKER, Nat. Tyds. Ned. Ind., iv, 1853, 507.

Carcharias (Prionodon) brachyrhynchus, BLEEKER, Act. Soc. Sc. Indo-Neerl., vi, 1859, 206.—DUMERIL, Elasmobr., 364.

Localities: Christmas and Washington Islands. Young and fœtus. Gray, with all the fins of the body tipped with black.

IV.—*Fishes from the Samoan Islands, collected by A. B. Stein-*

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BALISTIDÆ.

BALISTES ACULEATUS, *Linn.** [No. 15138].

Young specimen. Two and a half inches long.

GOBIIDÆ.

BRACHYELEOTRIS CYANOSTIGMA, *Blkr.*† [No. 15115].

Similar in every respect, even to the presence of the rudimentary spines on the præoperculum, to those described from the Hawaiian Islands.

GOBIUS ECHINOCEPHALUS, *Rüpp.* [No. 15113].

Gobius echinocephalus, RÜPPELL, Alt. Fische, 1828, 136; N. W. Fische, 1837, 137, 138.—CUV. & VAL., Hist. Nat. des Poiss., xii, 1837, 134.—GÜNTHER, Cat. Fish., iii, 1861, 34.—KLUNZINGER, Verh. zoöl.-bot. Gesel., xxi, 1871, 475.

Gobius amiciensis, CUV. & VAL., op. cit., xii, 1837, 135.—GÜNTHER, op. cit., iii, 1861, 35.—KNER & STEINDACHNER, Sitz. d. k. Ak. d. Wissen., Math.-Naturwissen. Classe, liv, i, 1866, 367.

D. $6\frac{1}{10}$. A. $\frac{1}{9}$. L. lat. 23–24. L. trans. 8.

Height of the body one-fourth of the total length. Head as high as long, very obtuse in front; cleft of mouth nearly vertical. The outer series of teeth in both jaws enlarged; in the lower jaw in front, on either side of the symphysis, and behind the other teeth of the jaw, is a large canine tooth, curved backward. Head and vertex, to the commencement of the first dorsal fin, naked; cheeks swollen, and together with the under surface of the head, covered with small warts and short cirri. Gill-openings narrow, of the same length as the base of the pectoral fin. Ventrals subcircular; caudal rounded. Body light brown; head somewhat lighter; fins dark brown.

GOBIODON CITRINUS, (*Rüpp.*) *Gthr.* [No. 15114].

Gobius citrinus, RÜPPELL, N. W. Fische, 1837, 139, pl. 32, f. 4.

Gobiodon citrinus, GÜNTHER, Cat. Fish., iii, 1861, 87.—KLUNZINGER, Verh. zoöl.-bot. Gesel., xxi, 1871, 480.

Head and body compressed; head rounded, very obtuse in front. Scales none. No canine teeth. Yellow, with a blue black-edged streak

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* See synonymy under Fishes from Fanning Islands.

† See synonymy under Hawaiian Fishes.

along the base of the dorsal and anal fins; two similar, but vertical, streaks through and below the eye; another in front of the pectoral fin, commencing above, and terminating on the base. The first dorsal with a narrow, black margin. All the specimens were enveloped in a thick mucous covering, which completely obscured the markings of the body.

GOBIODON CERAMENSIS, (*Blkr.*) *Gthr.* [No. 19250].

Gobius ceramensis, BLEEKER, Nat. Tyds. Ned. Ind., iii, 1852, Ceram, ii, 704.
Gobiodon ceramensis, GÜNTHER, Cat. Fish., iii, 1861, 88.

D. $6\frac{1}{10}$. A. $\frac{1}{8}$.

Scales none. Height of the body is contained $3\frac{1}{2}$ times in the total length, and the length of the head $4\frac{1}{2}$ times in the same. Head and body compressed, the former as high as long; eyes close together; the profile of the snout descends nearly vertically from between the eyes. Lower jaw with canine teeth in front, behind the outer band. Caudal rounded. Brown, with blackish fins.

SCORPÆNIDÆ.

SEBASTOPSIS GUAMENSIS, (*Q. & G.*) [Nos. 15106, 15136].

Scorpæna guamensis, QUOY & GAIMARD, Voy. Uran. Zoöl., 1824, 326.—GÜNTHER, Jour. Mus. Godeffr., ii, 1874, Fische der Sudsee, i, 74, pl. 56, f. B.
Scorpæna rubropunctata, CUV. & VAL., Hist. Nat. des Poiss., iv, 1829, 324.
Sebastes minutus, CUV. & VAL., op. cit., iv, 1829, 348.—GÜNTHER, Cat. Fish., ii, 1860, 106.
Scorpæna chilioprista, RÜPPELL, N. W. Fische, 1837, 107, pl. 27, f. 3.—GÜNTHER, Cat.

POMACENTRIDÆ.

DASCYLLUS ARUANUS, (*L.*) *C. & V.* [No. 15104].

Chætodon aruanus, LINN., Syst. Nat., i, 1766, 464.—BLOCH, Ausländ. Fische, iii, 1787, 62, pl. 198, f. 2.—BLOCH, Syst. Ichth., ed. SCHN., 1801, 220.—SHAW, Gen. Zoöl., iv, 1803, 348.

Chætodon abu dafur, FORSKÅL, Descr. Anim., 1775, 15.

Lutjanus aruanus, LACÉP., Hist. des Poiss., iv, 1803, 720.

Pomacentrus aruanus, RÜPPELL, Atl. Fische, 1828, 39.

Dascyllus aruanus, CUV. & VAL., Hist. Nat. des Poiss., v, 1830, 434.—GÜNTHER, Cat. Fish., iv, 1862, 12.

Chætodon araneus, BENNETT, Fish of Ceylon, 1837, pl. 17.

Tetradrachmum arcuatum, CANT., Mal. Fish., 241.

Body with three black cross-bands, extending on the dorsal and anal fins; the first descends obliquely from the commencement of the spinous dorsal, through the eye, to the chin, leaving a round, greyish space between the eyes; the second band is bowed, and extends from the middle of the spinous dorsal to the ventral fins; the third from the posterior part of the soft dorsal to the anal fin. Ventrals black; caudal white. Anus black.

CHROMIS LEPIDURUS, (*C. & V.*) *Streets* [No. 15116].

Heliastes lepidurus, CUV. & VAL., Hist. Nat. des Poiss., v, 1830, 498.—GÜNTHER, Cat. Fish., iv, 1862, 63.

Heliastes frenatus, CUV. & VAL., op. cit., v, 1830, 498.—GÜNTHER, op. cit., iv, 1862, 62.

D. $\frac{13}{10}$. A $\frac{2}{10}$. L. lat. 27. L. trans. $\frac{1\cdot2}{8}$.

Height of the body is one-half of the total length (without caudal), and the length of the head is contained about three times in the same. But one distinct series of conical teeth. The diameter of the eye longer than the snout, and is contained about two and two-thirds times in the length of the head. Caudal fin forked, and its basal half scaly. Cerulean; silvery on the breast and lower part of the head; a bluish-white streak from the eye to the snout; fins minutely punctate; pectoral yellowish, a black spot in the axil above.

One specimen, larger than the others (1.20 inches), of a brownish-metallic luster, with some scattered blue spots on the sides.

GLYPHIDODON ANTJERIUS, (*C. & V.*) *Gthr.* [No. 15117].

Glyphisodon antjerius, Cuv. & Val., Hist. Nat. des Poiss., v, 1830, 481.—Bleeker Nat. Tyds. Ned. Ind., viii, 1855, Kokos, iv, 454.

Glyphisodon biocellatus, Cuv. & Val., op. cit., v, 1830, 482.—Quoy & Gaim., Voy. Uran. Zoöl., 1824, 389.—Bleeker, op. cit., viii, 1855, Sumatra, ii, 286.—Lesson, Voy. Coq. Zoöl., Poiss., 1830, 188.

Glyphisodon zonatus, Cuv. & Val., op. cit., v, 1830, 483.

Glyphisodon punctulatus, Cuv. & Val., op. cit., v, 1830, 484.

Glyphidodon antjerius, Günther, Cat. Fish., iv, 1862, 50.

D. $\frac{13}{13}$. A. $\frac{2}{13}$. L. lat. 26.

Var. γ of Günther. Ground-color brownish, every scale on the body with one or more blue spots; similar spots on the fins; a blue streak from the middle of the snout, where it joins with its fellow of the opposite side, along the upper margin of the eye to the base of the anterior portion of the spinous dorsal; a short streak along the upper part of the eye, and one through the eye below the pupil to the upper jaw; a streak around the lower margin of the orbit, and still another below this on the cheek; a large, black, blue-edged ocellus on the posterior spines of the dorsal fin, extending on the back; a similar ocellus, but smaller, on the base of the posterior rays of the soft portion of the dorsal, extending on the upper part of the caudal peduncle.

Var. δ. A blue transverse band from the sixth dorsal spine to in front of the anus; the blue streak from the snout, along the upper margin of the eye, to the base of the dorsal is absent. In other respects similar to var. γ.

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of the nape of the neck and of the forehead; another from the commencement of the lateral line, through the eye, to the snout, where it meets its fellow of the opposite side; the lower side of the head brownish; a round black spot on the base of the soft dorsal, extending from the sixth to the eleventh ray.

Length, 1.50 inches.

GLYPHIDODON BONANG, (*Blkr.*) *Gthr.* [No. 15114].

Glyphisodon bonang, BLEEKER, Nat. Tyds. Ned. Ind., 1852, Sumatra, i, 582.
Glyphidodon bonang, GÜNTHER, Cat. Fish., iv, 1862, 45.

D. $\frac{12}{15-16}$. A. $\frac{2}{13}$. L. lat. 29.

Immature.—Height of the body is contained nearly twice in the total length (without caudal). Infraorbitals scaly. Uniform brown, with some scattered bluish spots; a black spot, blue-edged in smaller specimens, on the posterior dorsal rays.

LABRIDÆ.

JULIS SCHWANEFELDI, *Blkr.* [No. 15133].

Julis schwanefeldi, BLEEKER, Nat. Tyds. Ned. Ind., iv, 1853, Sumatra, ii, 288; Atl. Ichth., i, 1862, 95, pl. 33, f. 7.—GÜNTHER, Cat. Fish., iv, 1862, 191.

Body with six brownish cross-bands; two reddish streaks from behind the eye to the margin of the operculum, and one in front of the eye to the snout. Two deep blue spots on the dorsal fin, one on the spinous dorsal between the first and the third spines; the other on the soft portion between the first and the third rays; four or five spots of like character below the soft dorsal, on the posterior cross-bands of the sides.

STETHOJULIS ALBOVITTATA, (*Lacép.*) *Gthr.* [No. 15139].

Labrus albovittatus, LACÉP., Hist. des Poiss., iii, 1803, 443, 509.
Julis balteatus, QUOY & GAIMARD, Voy. Uran. Zoöl., 1824, 267, pl. 56, f. 1.—CUV. & VAL., Hist. Nat. des Poiss., xiii, 1839, 475.—BLEEKER, Nat. Tyds. Ned. Ind. ii, 1851, Banda, i, 253.
Stethojulis albovittata, GÜNTHER, Ann. & Mag. Nat. Hist., 1861, viii, 386; Cat. Fish., iv, 1862, 141.—BLEEKER, Atl. Ichth., i, 1862, 132, pl. 44, f. 5.

Four narrow, longitudinal bluish or whitish bands on the body; the upper commences at the upper margin of the orbit, and runs along the base of the dorsal fin; the second proceeds from the upper surface of the snout, through the eye, and terminates under the anterior part of the

lateral line; the third from the side of the snout, below the eye, through the angle of the operculum, to the middle of the base of the caudal fin; the fourth begins on the under part of the lower jaw, crosses the cheek in a curve to the sub-operculum, ascends along the gill-opening to the base of the pectoral fin, where it is interrupted; commences again in the axil of pectoral, and terminates on the lower part of the base of the caudal; it is curved on the body.

ACANTHURIDÆ.

ACANTHURUS LINEATUS, (*Gm.*) *Bl. Schn.* [No. 15131].

Chætodon lineatus, GMÉLIN, Syst. Nat., i, 1788, 1246.

Acanthurus lineatus, BLOCH, Syst. Ichth., ed. SCHN., 1801, 214, pl. 49.—CUV. & VAL., Hist. Nat. des Poiss., x, 1835, 223.—GÜNTHER, Cat. Fish., iii, 1861, 333; Jour Mus. Godeffr., ii, 1875, Fische der Sudsee, i, 111, pl. 70.

Acanthurus rittatus, BENNETT, Fish of Ceylon, 1837, pl. 2.

CHILODIPTERIDÆ.

APOGON AURITUS, *C. & V.** [No. 15134].

Densely sprinkled with brown; a black, white-edged spot on the operculum.

APOGON FASCIATUS, (*White*) *Q. & G.* [No. 15108].

[redacted]

APOGON GRÆFFI, *Günther* [No. 15110].

Apogon graeffi, GÜNTHER, Jour. Mus. Godeff., ii, 1873, Fische der Sudsee, i, 22, pl. 20, f. E.

D. $6\frac{1}{9}$. A. $\frac{2}{8}$. L. lat. 24. L. trans. 8.

Greatest height of the body slightly more than one-third of the total length, and is contained $2\frac{1}{3}$ times in the same without the caudal. Diameter of the eye twice the length of the snout, and two-fifths of the length of the head. None of the bones of the head serrated. The end of the upper maxilla reaches nearly to the vertical from the center of the eye. The middle spines of the first dorsal prolonged, thread-like; the first very long, reaching, when laid back, to the summit of the second dorsal; second dorsal lower than the body. Silvery on the side of the head and breast; head dotted; the dots under a lens are seen to be stellate; a row of minute dots along the dorsal line of the body. The dorsal fins minutely punctate; the first darker than the second.

Length, two inches.

[No. 19249.] Another specimen of the same species in which the second dorsal spine is less prolonged, and the back and sides are covered with stellate spots; a brown spot on each side of the base of the caudal fin. In other respects similar to the above.

BERYCIDÆ.

HOLOCENTRUM DIADEMA, *Lacép.* [Nos. 15109, 15132].

Holocentrum diadema, LACÉP., Hist. des Poiss., iv, 1803, 372, 374; iii, 1803, pl. 32, f. 3.—RUPPELL, Atl. Fisches, 1828, 84, pl. 22, f. 2.—CUV. & VAL., Hist. Nat. des Poiss., iii, 1829, 213.—LESSON, Voy. Coq. Zoöl., 1830, ii, 220, pl. 25, f. 2.—GÜNTHER, Cat. Fish., i, 1859, 42; Jour. Mus. Godeffr., ii, 1874, Fische der Sudsee, i, 97.

Perca pulchella, BENNETT, Zoöl. Jour., iii, 377, pl. 9, f. 3.

Red, with nine longitudinal silvery bands along the side; spinous dorsal blackish, with a white, curved band along the middle, here and there interrupted; the upper edge of the membrane between the spines white; the space between the second spine and first ray of the anal fin clouded.

MUGILIDÆ.

AGONOSTOMA DORSALIS, n. sp. [No. 15111]

D. $4\frac{1}{8}$. A. $\frac{3}{9}$.

The height of the body is one-fifth of the total length, and the len of the head is contained four and a half times in the same. Small te in the upper jaw; no teeth in the lower jaw, on the vomer, or palati Eyes without adipose membrane. Upper lip thin. The end of the m illa extends to the vertical from the front margin of the orbit. In orbital space flat. Præorbital serrated anteriorly and below. anterior dorsal commences midway between the end of the snout the base of the caudal fin.

Silvery, with a metallic luster along the back; the base of the sec dorsal fin black.

Length, 1.50 inches.

CRUSTACEA.

MAIIDÆ.

LIBININÆ.

LIBINIA SEMIZONALE, *Streets.* n. sp.

Carapace pyriform; regions distinctly marked; surface shining, uneven, and shortly pubescent in places; pubescence more marked anteriorly; spinous. The arrangement of the spines is as follows:—eight in the median line of the body, placed, four on the gastric region, one on the genital, two on the cardiac, and one on the intestinal; on the anterior portion of the gastric region are two other spines, arranged transversely, in a line with the first one of the longitudinal series; so that all the spines of this region form the letter T; on the hepatic region are two spines, placed one above the other; immediately beneath these, on the lateral line, is another (on the left side there were two); the spines on the hepatic region, with those on the lateral line and the transverse row on the gastric region, taken together form a semicircle across the anterior portion of the carapace; sub-hepatic spines two, the anterior of which is the larger; there is another under the lateral line posterior to a sulcus separating the hepatic and branchial regions; four on the middle of the branchial region, inclosing a regular diamond-shaped space; another small spine on the upper part of the same region, on the edge of the depression separating it from the cardiac region; finally, there is an elevation, or a faint trace of a spine, on the posterior part of the branchial region.

Rostrum prominent, broad; broadest at the base, and slightly converging to the points; directed upward at an angle with the body; convex above and densely pubescent; the entire under surface deeply excavated; its apex obliquely truncated above, producing, by reason of its hollow under surface, two points, the outer surfaces of which are

straight and nearly parallel, while the inner margins are sloping, and converge to the median line of the rostrum; along the inner edge of the tips is arranged a row of long, stiff hairs; sides of the rostrum slightly concave, and at the base of the upper surface is a broad, shallow depression, which narrows to the apex of the bifurcation. A prominent spine projects over the inner canthus of the eye; the outer angle of the orbit not produced; a deep sulcus on the superior border of the orbit, which is bridged over at the top by a small spine, which arises from the base of the prominent spine at the inner canthus; on the inferior border of the orbit is another fissure, from the bottom of which is a strong spine, springing from the base of the outer angle, and projecting inward and downward under the basal article of the external antenna.

External antennæ hidden under the rostrum; the basal article robust, longer than broad, forming a part of the inferior border of the orbit; the external angle produced in the form of a tooth; the remaining articles slender and cylindrical; a row of long stiff hairs along the entire inner side of the antennæ.

Legs slender, smooth, and shining like the carapace; the joints cylindrical, with the exception of the fourth, which is depressed, and marked by a longitudinal depression above and below; the tarsi are tapering and armed with long corneous points; the anterior pair of feet only very slightly more robust than the following; the hands much compressed; fingers slender, white at the tips, with their cutting edges approximating along nearly their entire length.

[redacted]

CANCRIDÆ.

XANTHINÆ.

ATERGATIS LIMBATUS, (*Edw.*) *Dana.*

Atergatis limbatus, DANA, U. S. Expl. Exped. Crust., i, 157.—HELLER, Crust. Novara Exped., 8.
Xantho granulosus, RÜPPELL, Krabben des rothen Meeres, 24, pl. 5, f. 3.
Egle granulosus, DE HAAN, Faun. Japon., 17.
Cancer limbatus, EDWARDS, Hist. Nat. des Crust., i, 377, pl. 16, f. 1.

Locality: Hawaiian Islands.

CHLORODINÆ.

ETISUS LEVIMANUS, *Randall.*

Etisus levimanus, RANDALL, Jour. Acad. Nat. Sci. Philadelphia, viii, 115.—DANA, U. S. Expl. Exped. Crust., i, 185, pl. 10, f. 1.

Locality: Hawaiian Islands.

CHLORODIUS UNGULATUS, *Edwards.*

Chlorodius ungulatus, EDWARDS, Hist. Nat. des Crust., i—DANA, U. S. Expl. Exped. Crust., i, 205, pl. xi, f. 8.

Locality: Hawaiian Islands.

CHLORODIUS SANGUINEUS, *Edwards.*

Chlorodius sanguineus, EDWARDS, Hist. Nat. des Crust., i, 402—DANA, U. S. Expl. Exped. Crust., i, 207, pl. xi, f. 11.—HELLER, Crust., Novara Exped., 18.
Chlorodius exaratus, STIMPSON, Proc. Acad. Nat. Sci. Philadelphia, 1858, 34.—EDWARDS, Hist. Nat. des Crust., i, 402.—DANA, U. S. Expl. Exped. Crust., i, 208.
Chlorodius inæqualis, AUDOUIN, Explic. des. pl. de Savigny.—SAVIGNY, Desc. de l'Egypte. Crust., pl. v, f. 7.
Chlorodius Edwardsii, HELLER, Sitzungsberichte der Wiener Akademie, Bd., xliii, 336.
Cancer (*Xantho*) *lividus*, DE HAAN, Faun. Japon., 48, pl. xiii, f. 6.
Cancer (*Xantho*) *affinis*, DE HAAN, l. c. 48, pl. xiii, f. 8.

Locality: Hawaiian Islands.

ERIPHIDÆ.

ERIPHINÆ.

TRAPEZIA MACULATA, (*M'Leay*) *Dana.*

Trapezia maculata DANA, U. S. Expl. Exped. Crust., i, 256, pl. xv, f. 4.—STIMPSON, Pro Acad. Nat. Sci. Philadelphia, 1858, 37 ; Ann. Lyc. Nat. Hist. N. Y., vii, 219.

Trapezia maculatus, KRAUSS, Südaf. Crust., 36.

Trapezia guttata, RÜPPELL, Krabben des rothen Meeres, 27.—HELLER, Crust., Novar Exped., 25.

Trapezia tigrina, EYDOUX & SOULEYET, Voy. de la Bonita, pl. ii, f. 4.

Grapsillus maculatus, M'LEAY, Crust. of Smith's Illust. Zoöl. S. Africa, 67.

Locality: Hawaiian Islands.

PORTUNIDÆ.

LUPINÆ.

NEPTUNUS SANGUINOLENTUS, (*Herbst*) *De Haan.*

Neptunus sanguinolentus, DE HAAN, Faun. Japon. Crust., 38.—ALPH. M. EDWARDS, A du Mus. d'Hist. Nat. de Paris, 1860, x, 319.—HELLER, Crust. Novara Exped.

Lupa sanguinolenta, DESMAREST, Crust., 99.—M. EDW., Hist. Nat. des Crust., i, 451 Cuv. Règn. Anim. pl. x, f. 1.—DANA, U. S. Expl. Exped. Crust., i, 271.—STIMPSON, Proc. Acad. Nat. Sci. Phila., 1858, 38.

Portunus sanguinolentus, FABR., Suppl. Entom. syst., 365.—LATR., Encyclop. Metho-

THALAMITA INTEGRA, *Dana.*

Thalamita integra, DANA, U. S. Expl. Exped. Crust., i, 281, pl. xvii, f. 6.—ALPH. M. EDWARDS, Arch. du Mus., x. 356.—STIMPSON, Proc. Acad. Nat. Sci. Phila. 1858, 39.

Locality: Hawaiian Islands.

The resemblance between the two preceding species of *Thalamita* is very close, and at first sight they may be very readily confounded; yet their differences are well marked and constant. In collecting them, the two kinds were thrown together as belonging to the same species; but when their specific characters were once recognized, there was no difficulty in separating the one from the other. The *integra* is much more abundant in the harbor of Honolulu, than the *admete*. In a lot of twenty-seven, collected from that locality, there were twenty-two of the former and five of the latter.

The following are the chief points of difference between the two species. In *integra* there are two spines on the superior edge of the hand; one, sharp-pointed, is situated on the middle of the border, and its base is continuous with an abrupt ridge running to the base of the hand; the second spine, usually blunt and eroded in the adult, but sharp-pointed in the young, is placed on the extreme distal angle of the upper border, and is also continuous by its base with another abrupt ridge, which extends toward the middle of the hand, but which is interrupted at the base of the first spine. The position of this second spine is a point of great diagnostic importance. Exterior to the superior edge is another spine, more or less worn down, the base of which coalesces with a rounded ridge, running toward the base of the hand; in front of and a little superior to the last, at the angle, is a slight prominence; there is a fourth spine at the base of the hand near the carpal articulation. The surface of the hand is smooth.

In *admete* there are likewise two spines on the superior border of the hand; but their arrangement is somewhat different. The outer one is not placed on the extreme distal angle of the hand, but is posterior to it; and the ridge which extends to the base of the hand, from the spine on the middle of the border, is serrated. The other spines on the hands have exactly the same arrangement as in *integra*. The superior surface of the hand is sparsely and coarsely granular; the inferior border finely granular.

The carapace furnishes some additional characters. In *integra* the

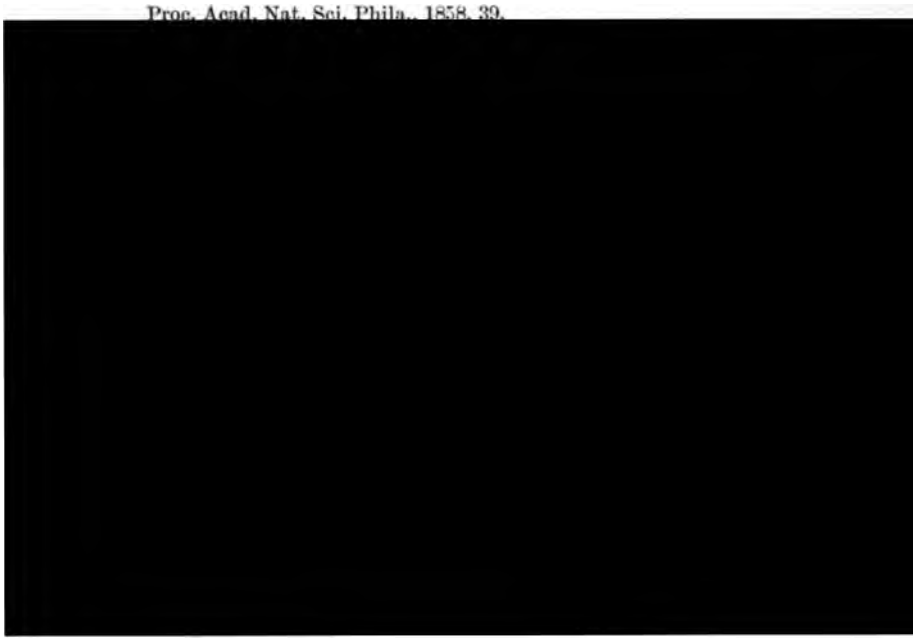
front is not on a straight line throughout its entire length, in the majority of cases. The crest of the base of the outer antennæ is not denticulated. Dana states that the "median region is not crossed by any raised lines;" while his figure shows them. They were present in all the specimens examined by me, and in this respect the species does not differ from *admete*. Anterior to the line crossing the middle region, and on either side of the median line of the body are two slight prominences; posterior to the median line is another, "which reaches to the posterior tooth on either side." The antero-lateral margin is four-toothed as in *admete;* only occasionally do we find a fifth tooth developed. The carapace is more convex.

The manner in which the carapace of the *admete* differs from the above description is briefly, as follows: The lines on the surface of the carapace are more prominent; in place of the two prominences anterior to the line crossing the median region of the body are two short serrated lines; and there are, in addition to these two, others of the same character, anterior to the extremities of the median transverse line. The carapace is more compressed, and "the crest of the base of the outer antennæ is evenly and short denticulated."

THALAMITA PYRMNA, (*Herbst*) *M. Edw.*

Thalamita prymna, M. EDWARDS, Hist. Nat. des Crust., i, 461.—DE HAHN, Faun. Japon. Crust., 43, pl. xii, f. 2.—ALPH. M EDWARDS, Arch. du Mus. d'Hist. Nat., 1860, x, 360.

Thalamita crassimana, DANA, U. S. Expl. Exped. Crust., i, 284, pl. xvii, f. 9.—STIMPSON, Proc. Acad. Nat. Sci. Phila., 1858, 39.



at the outer angle, is short and sometimes broken off. In every other respect the specimens examined are identical with the description and figure given by Dana. The fourth tooth on the antero-lateral margin is smaller than the rest, but the difference is not so great as is pictured in the figure.

ACHELOUS GRANULATUS, (*M. Edw.*) *Alph. M. Edwards.*

Achelous granulatus, ALPH. M. EDWARDS, Arch. du Mus. d'Hist. Nat. de Paris, 1860, x, 344.

Amphitrite speciosa, DANA, U. S. Expl. Exped. Crust., i, 276, pl. xvii, f. 1.—STIMPSON, Proc. Acad. Nat. Sci. Phila., 1858, 39.

Amphitrite gladiator, DE HAÂN, Faun. Japon. Crust., 65, pl. xviii, f. 1 (et non pl. 1).

Lupa granulata, M. EDWARDS, Hist. Nat. des Crust., i, 454.

Locality: Fanning Group of Islands, North Pacific.

CARCINUS MŒNAS, (*Linn.*) *Leach.*

Carcinus mœnas, LEACH, Melac. Podophth. Brit., pl. v; Edinb. Encyclop., vii, 429; Trans. Linn. Soc., xi, 314; Encyclop. Britann. Suppl., i, 410.—AUDOUIN, dans l'ouvrage de Savigny, Egypte. Crust., pl. iv, f. 6.—M. EDWARDS, Hist. Nat. des Crust., i, 434.—GOULD, Report on the Invertebrata of Massachusetts, 321.—DE KAY, Nat. Hist. N. Y., Crust., 8, pl. v, f. 5-6.—BELL, British. Crust., 76.—ALPH. M. EDWARDS, Arch. du Mus. d'Hist. Nat. de Paris, 1860, x, 391.—HELLER, Crust. Novara Exped., 30.

Carcinus granulatus, SMITH, Report of Commissioner of Fish and Fisheries, 312, 547.

Portunus mœnas, LEACH, Edinb. Encyclop., vii, 390.—COSTA, Fauna del regno di Napoli, Crust. g. Portuno., 7.

Cancer granulatus, SAY, Jour. Acad. Nat. Sci. Phila., 1817, i, 61.

Cancer mœnas, LINN., Syst. Nat., xii, i, 1043.—PENNANT, Brit. Zoöl., iv, 3, pl. iii, f. 3.—BASTER, op. subst. ii, 19, pl. ii.—HERBST, Krabben und Krebse, pl. vii, f. 46.—FABRICIUS, Entom. Syst. Suppl., 11, 450; 41, 334, 3.—LATREILLE, Gen. Crust. et Insect., 1, 30, 2.

Locality: Hawaiian Islands.

This is the first well-authenticated instance, to my knowledge, where the genus *Carcinus* is recorded as coming from the Pacific regions. In the museum of the Academy of Natural Sciences of Philadelphia, there is a specimen labeled from Australia, with an interrogation mark. It is probable that all the specimens obtained from this region have only been stragglers from the Atlantic. The Hawaiian Islands, where the last came from, have been thoroughly ransacked by collectors for this kind of life; and, had the species been common, it could not have well eluded the search so long. That it is a wandering crab, almost cosmopolitan in

its range, is seen by glancing at the extent of country that is embraced in its wanderings. It is common on the coasts of France and England; it is found in the Baltic Sea, along the shores of the Mediterranean, and in the Red Sea. It is by no means an uncommon crab along the whole extent of the eastern coast of the United States, and Heller records it as coming from the shores of Brazil.

I am able to detect some differences, amounting probably to a slight geographical variation, among the specimens coming from these widely separated localities. Those from the American coast differ from the European in having a slight increase in the convexity of the carapace, with coarser granulations over its surface. The teeth of the front are also much more prominent. In the European specimens the projections of the front hardly amount to more than undulations; while in those from this side they are teeth-like. An increased development in the same direction is observed in the individual from the Hawaiian Islands. If what I have stated here should hold good through a large series of specimens, it will be an interesting instance of progressive development from east to west, where the difference in the local conditions are less pronounced than from north to south in corresponding degrees of longitude.

ASSECLA, *nov. gen.*

Carapace convex, broader than long, smooth and shining; front broad, produced, broadly triangular; antero-lateral and postero-lateral borders nearly equal in length; the latter converging posteriorly; antero-lateral border five-lobed; hiatus at the internal angle of the orbit completely closed by a process from the base of the external antenna; the movable part of the antenna excluded from the hiatus; a process from the front descends to meet the process from the base of the external antenna. The third joint of the external maxillipeds longer than broad at the base; broader at the base than at the apex, irregularly quadrilateral; inner angle of the base somewhat projecting. A prominent ridge on the palate; the ridge is not produced to the anterior margin of the buccal area. Basal article of the external antennæ large, nearly longitudinal. Arm not projecting beyond the carapace; hand short, carinated; tarsus of the posterior pair of legs flattened, subovate, or lanceolate-ovate; very slightly modified into a swimming apparatus.

In respect to the development of its natatorial feet this genus bears the same relation to *Lissocarcinus*, as *Carcinus* does to *Platyonichus*.

ASSECLA HOLOTHURICOLA, *n. sp.*

Carapace broader than long, surface smooth and shining; the antero-lateral and postero-lateral borders very nearly of the same lengths; front broad, produced, broadly triangular, on a higher level than the antero-lateral border, and continuous with the superior margin of the orbit; anterior margin somewhat sinuous; the antero-lateral border thin, everted, five-lobed; second lobe the broadest; the free margins of the lobes straight; the angles slightly rounded; the divisions separated only by fine incisions; the gastric region of the carapace elevated; the antero-lateral parts much excavated. The lateral projection at the junction of the antero- and postero-lateral borders more tooth-like than lobular, and more projecting than the other lobes, th'ck and obtuse; a high, prominent ridge running from its apex, at first, inward and slightly backward, and then inward and forward on the swollen portion of the carapace, terminating abruptly at the junction of the middle with the lateral third of the breadth of the carapace; a flattened, scarcely prominent ridge anterior to and parallel with the preceding, terminating at the bottom of the lateral sulcus. The prominent edge of the postero-lateral border converging posteriorly. The post-orbital angle of the first lobe not rounded, rectangular; a fissure on the superior margin of the orbit near the external angle; the inferior margin entire, finely granular; a fissure at the outer angle; the inner angle projecting as a prominent tooth. Areolations on the surface of the carapace indistinct; a shallow depression extending to the apex of the front, and on either side of this is a broad prominence (2 F and 1 M consolidated); 2 M and 3 M consolidated; 1 P slightly prominent. Central line of the body high and convex, sloping toward the sides, which are concave. The first and second joints of the external antennæ cylindrical; the apex of the second joint on a level with the frontal margin.

The third joint of the outer maxillipeds longer than broad; inner margin oblique; superior margin straight; angles prominent; irregularly rectangular in outline, broader at the base than at the top. Inferior regions finely pubescent; the pubescence only seen under the lens.

Hand strongly bicarinated on the superior surface; a well-marked ridge on the middle of the external surface; above the preceding is a flattened, nearly obsolete ridge; the inferior surface smooth; a high crest along the whole length of the upper edge of the movable finger; at the base of the crest, on either side, is a sulcus, extending the entire length of the finger; the inner and outer surfaces of both fingers deeply

grooved; thumb slightly deflexed on the palm; apices of fingers pointed, beaked, and overriding when closed; cutting-edges strongly toothed; five prominent, conical teeth on each edge; sometimes two smaller ones between second and third, and third and fourth; carpus carinated above; two ridges on the external surface; an obtuse spine projecting from the anterior part of the inner surface; the ridges on the carpus sinuous; arm smooth, and not projecting beyond the lateral border of the carapace.

The posterior legs compressed; contracted at the articulation of the third and fourth articles; the fifth article and all the tarsi, except those of the last pair of legs, furrowed on their anterior and posterior surfaces; on the anterior surface of the tarsi the two furrows, the one above and the other below, separated by a prominent ridge, become continuous at the proximal extremity around the base of the ridge; the fifth joint and tarsus of the last pair compressed to a greater degree than the corresponding joints of the preceding legs; tarsus very much flattened, not grooved, oblong-ovate; apex corneous, hooked; a few short and fine hairs on the lower border of the tarsi; at the base of the tarsus of the last pair, and at the distal extremity of the fifth joint below, is a tuft of hairs.

Abdomen of female broadly ovate, and composed of seven pieces.

Color: The whole upper surface of the carapace purple, with the following exceptions: a narrow line of white around the entire free margin of the carapace, following the incisions between the lobes on the antero-lateral border; a round spot of the same color at the anterior superior angle of the orbit, and a short oblong spot, commencing at the apex of the front, extending its whole length; a round spot on the apex of the projecting lateral tooth, and another, similar, on the carapace just anterior to the termination of the lateral ridge. The arrangement of the colors on the legs is somewhat peculiar. Ground color purple; the distal extremities of the third and fifth joints, and the proximal end of the fourth, white. The purple color extends over the whole hand, except at the base of the movable finger, and on the palm opposite the articulation of the finger; the carinæ white; a ring of purple around the carpus; the proximal extremity white, and a spot of the same color on the distal end above; the upper surface of the arm purple.

Length, 0.45 inch; breadth, 0.56 inch; ratio of length to breadth, 1: 1.2

Locality: Palmyra Island, North Pacific. Taken from the cloacal dilatation of the alimentary tract of a *holothurian*. This is the first in-

stance on record where a crustacean of the family *Portunidæ* has been found living as a "free messmate" in another animal. Others possessing this habit have belonged, without exception, to families much lower in the scale of classification. The elaborate system of coloration, and the asperities on the surface of the carapace of this crab, would incline us to believe that this is not its permanent place of residence. The *Pinnotheridæ* are devoid of color-markings, and their shell is more or less rounded, the irregularities of the surface being removed by the constant pressure to which it is subjected by the living walls of their dark abode.

Belonging to this new genus, and closely allied to the above, is *Lissocarcinus orbicularis*, Dana. The arrangement of the colors on the legs is almost identical in the two species; the general shape of the front is similar, and there is the same smooth and shining surface. The *holothuricola*, however, is readily distinguished by its being less orbicular, and more produced transversely, and by the prominent posterior tooth of the antero-lateral border. The third joint of the outer maxillipeds is straight, and almost quadrangular; in *orbiculare* its shape is more irregular. In the latter the antero-lateral margin is a "little reflexed," while in the former it is everted. The shape of the claws and ambulatory feet is the same in both species.

PODOPHTHALMUS VIGIL, (*Fabr.*) *Leach.*

Podophthalmus vigil, LEACH, Zoöl.Miscell., ii, pl. cxviii.—GUERIN, Icon. du Règne Anim. Crust., pl. i, f. 3.—M. EDWARDS, Hist. Nat. des Crust., i, 467; Règne Anim. de Cuvier, Crust., Atlas, pl. ix, f. 1.—DE HAAN, Faun. Japon., Crust., 44.—ALPH M. EDWARDS, Arch. du Mus. d'Hist. Nat. de Paris, 1860, x, 420.

Podophthalmus spinosus, LAMARCK, Syst. des Anim. sans vertèb., 152; Hist. des Anim. sans vert., v, 157.—LATREILLE, Gen. Crust. et Insect., i, pl. i et ii, f. 1; Hist. Nat. des Crust. et des Insect., vi, 54, pl. xlvi; Règne Anim. de Cuvier, iv, 33; Encyclop. Meth., x, 166.—DESMAREST, Considerat. sur les Crust., 100, pl. vi, f. 1.

Portunus vigil, FABRICIUS, Suppl. Entom. Syst., 368, no. 1.

Locality: Fanning Group of Islands, North Pacific.

MACROPHTHALMIDÆ.

OCYPODINÆ.

GELASIMUS GIBBOSUS, *Smith.*

Gelasimus gibbosus, SMITH, Trans. Connecticut Acad., vol. ii, 140, pl. ii, f. 1, et pl. iv, f. 8; Report of the Peabody Academy of Sciences, 1869, 91.

Locality: La Paz, Lower California.

OCYPODA CERATOPHTHALMA, (*Pallas*) *Fabr.*

Ocypoda ceratophthalma, FABR., Suppl. Entom. Syst., 347.—LATR., Hist. Nat. des Crust., vi, 47; Encyclop. Meth., pl. 274, f. 1.—DESMAREST, Consid. sur les Crust., 121, pl. 12, f. 1.—DE HAAN, Faun. Japon., Crust., 29.—M. EDWARDS, Hist. Nat. des Crust., ii, 48; Atlas du Règne Anim. de Cuvier, Crust., pl. 17, f. 1; Mélanges Carcinologiques, 105.—KRAUSS, Südafrik. Crust., 41.—STIMPSON, Proc. Acad. Nat. Sci. Phila., 1858, x, 100.

Ocypoda brevicornis, M. EDWARDS, Hist. Nat. des Crust., ii, 48; Mélanges Carcinologiques, 106.—DANA, U. S. Expl. Exped., Crust., i, 326, pl. xx, f. 3.

Cancer ceratophthalmus, PALLAS, Spicil. Zoöl. fasc., 83, pl. 5, f. 17.

Locality: Fanning Group, North Pacific.

GECARCINIDÆ.

UCAINÆ.

CARDISOMA OBESUM, *Dana.*

Cardisoma obesum, DANA, Proc. Acad. Nat. Sci. Phila., 1851, v, 252; U. S. Expl. Exp[illegible] Crust., i, 375, pl. xxiv, f. 1.—M. EDWARDS, Mélanges Carcinologiques, 171 [illegible] STIMPSON, Proc. Acad. Nat. Sci. Phila., 1858, x, 100.

Cardisoma urvillei, M. EDWARDS, Mélanges Carcinologiques, 170.

Locality: Fanning Group. A lateral edge to the carapace is mo[illegible] apparent in the young and in females, than in the adult males. In th[illegible] former there is a small point, or projection, behind the post-orbit[illegible] angle. In the females the hands are shorter, the fingers are le[illegible]

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PACHYGRAPSUS CRASSIPES, *Randall.*

Pachygrapsus crassipes, RANDALL, Jour. Acad. Nat. Sci. Phila., viii, 127.—M. EDWARDS, Melanges Carcinologiques, 132.—STIMPSON, Jour. Boston Sci. Nat. Hist., 1857, vi, 27; Proc. Acad. Nat. Sci. Phila., 1858, x, 102.

Locality: Lower California.

GRAPSUS RUDIS, *M. Edw.*

Grapsus rudis, M. EDWARDS, Hist. Nat. des Crust., ii, 87; Annal. des Sci. Nat., 3 re Ser. xx, 168; Melanges Carcinologiques, 134.—GIBBES, Amer. Assoc. Advan. Science, 1850, 17.—STIMPSON, Proc. Acad. Nat. Sci. Phila., 1858, x, 102.—HELLER, Crust. Novara Exped., 47.

Grapsus hirtus, RANDALL, Jour. Acad. Nat. Sci. Phila., viii, 124.

Locality: Fanning Group.

GEOGRAPSUS CRINIPES, (*Dana*) *Stimp.*

Geograpsus crinipes, STIMPSON, Proc. Acad. Nat. Sci. Phila., 1858, x, 101.—HELLER, Crust. Novara Exped., 48.

Grapsus crinipes, DANA, Proc. Acad. Nat. Sci. Phila., 1851, v, 249; U. S. Expl. Exped., Crust., i, 341, pl. xxi, f. 6.—M. EDWARD, Melanges Carcinologiques, 136.

Locality: Fanning Group. There is less concavity in the posterior border of the epistome in this specimen than is given in Dana's figure. This authority lays particular stress upon this point, but I deem it of minor importance. The specimen agrees in every other particular.

PINNOTHERIDÆ.

PINNIXIA TUMIDA, *Stimp.*

Pinnixia tumida, STIMPSON, Proc. Acad. Nat. Sci. Phila., 1858, x, 108.

Locality: Bellañas Bay, Lower California. Removed from the interior of the body of a *holothurian.*

Although separated by the entire width of the Pacific Ocean, yet this specimen agrees in every particular with the description given by Stimpson of a species from the port of Hakodadi, on the island of Jesso. *P. tumida* and *P. faba*, Dana, are the only species of this genus that are characterized by the absence of ridges on the superior surface of the carapace. There is nothing in Dana's description of his species, which came from Puget Sound, which would militate against this being the same; but in the plate a figure of the hand is given, in which the fingers are oblique, as in *tumida*, but there is no hiatus between them, and the

tooth on the middle of the movable finger is wanting, both of which points are very characteristic of *tumida*.

The other species of crustacea which are common to both the Asiatic and American shores of the Pacific are *Trapezia maculata*, *Liomera lata*, *Liomera cinctimana* and *Pachygrapsus crassipes*. The latter, a subterrestrial crab, was obtained by Stimpson from the port of Simoda, Japan. The first three are littoral in their habits, and are Indo-Pacific species. On the American side all of these species have come, so far, from the Lower Californian coast only.

CALAPPIDÆ.

CALAPPA TUBERCULATA, *Fabr.*

Calappa tuberculata, FABRICIUS, Suppl. Entom. Syst., 345.—HERBST, Krabben und Krebse, 204, pl. 13, f. 78.—GUÉRIN, Iconog. Crust., pl. 12, f. 2.—M. EDWARDS, Hist. Nat. des Crust., ii, 106.—DANA, U. S. Expl. Exped. Crust., i, 393.—STIMPSON, Proc. Acad. Nat. Sci. Phila., 1858, x, 162.—HELLER, Crust. Novara Exped., 69.
Calappa hepatica, DE HAAN, Faun. Japon. Crust., 70.

Locality: Hawaiian Islands.

HIPPIDÆ.

BLEPHAROPODA OCCIDENTALIS, *Randall.*

Blepharopoda occidentalis, RANDALL, Jour. Acad. Nat. Sci. Phila., viii, 131, pl. vii.—GIBBES, Proc. Amer. Assoc. Advan. Sci., 1850, 187.—STIMPSON, Jour. Boston

CALCINUS LATENS, (*Randall*) *Dana.*

Calcinus latens, DANA, U. S. Expl. Exped. Crust., i, 459, pl. 28, f. 11.—STIMPSON, Proc. Acad. Nat. Sci. Phila., 1858, x, 234.—HELLER, Crust, Novara Exped., 88.
Pagurus latens, RANDALL, Jour. Acad. Nat. Sci. Phila., viii, 135.

Locality: Hawaiian Islands.

In alcoholic specimens the color of the carpus and anterior surface of the arm is red, with white spots. Some of the spots on the superior surface of the carpus are slightly elevated. In few of the specimens the red color of the carpus is very faint. The basal portion of the tarsi of the posterior legs, in some cases, is brownish-red, and in others purplish.

CLIBANARIUS ZEBRA, *Dana.*

Clibanarius zebra, DANA, U. S. Expl. Exped. Crust., i, 465, pl. 29, f. 5.—STIMPSON, Proc. Acad. Nat. Sci. Phila., 1858, x, 235.

Locality: Hawaiian Islands.

CENOBITIDÆ.

CENOBITA OLIVIERI, *Owen.*

Cenobita olivieri, OWEN, Crust. Beechey's Voy. Blossom, 84.—DANA, U. S. Expl. Exped., Crust., i, 470.—STIMPSON, Proc. Acad. Nat. Sci. Phila., 1858, x, 232.—HELLER, Crust. Novara Exped., 82.
Pagurus clypeatus, OLIVIER, Encyclop. Méth. Ins., viii, 643, pl. 311, f. 1.

Locality: Fanning Group.

We found this crab to be most abundant on Palmyra Island. They climbed the trees and bushes, dragging after them the heavy shell of the *Turbo argyrostoma*, which they use to the exclusion of all other shells. It is probable that they climb the trees for the purpose of feeding on the mosses and lichens that grow thereon.

CENOBITA PANAMENSIS, *Streets.*

Cenobita panamensis, STREETS, Proc. Acad. Nat. Sci. Phila., 1871, xxiii, 241.
Cenobita intermedia, STREETS, Proc. Acad. Nat. Sci. Phila., 1871, xxiii, 241.

Locality: Lower California.

When describing the type of this species in 1871, I stated that the tarsus of the third leg of the left side was shorter than the corresponding leg of the right side. As this difference is not observable in the present specimen, which agrees with *panamensis* in every other respect, it was doubtless nothing more than an individual variation. The tarsus of the third leg, left side, is slightly longer than that of the right side,

which is the case in *C. intermedia.* The failure of the principal point of difference between the species necessitates their union under one name. I therefore retain *panamensis*, and reduce *intermedia* to the status of a synonym.

The color is better defined in the recent specimen. The external surface of the larger hand is brown, except at the superior margin and at the posterior inferior angle; the upper half of the external surface of the carpus, both sides, of the same color as the hand; the lower half uncolored, or slightly stained with orange; a large spot of orange on the anterior, truncated surface of the arm. The fourth article of the posterior legs is marked in the same manner as the carpus, with the addition of a deep line of purple at the lower edge of the brown, which extends from the center of the article to its articulation with the third article; a brownish, or purplish, spot at the base of the fifth article. The spot is wanting on the last leg of the left side. The third joint of the last pair is purplish; the tarsi brownish-orange. The carapace anteriorly purplish; two patches of the same color posteriorly on each side. The peduncles of the eye a deep buff.

Total length of the carapace 1.00 inch.

BIRGUS LATRO, *Leach.*

Birgus latro, LEACH, Trans. Linn. Soc., xii—M. EDWARDS, Hist. Nat. des Crust., ii, 26; Atlas du Règne Anim. de Cuv., pl. 43, f. 1.—QUOY & GAIMARD, Voy. de l'Uranie, pl. 80.—DANA, U. S. Expl. Exped. Crust., i, 474, pl. 30, f. 5.—STIMPSON, Proc. Acad. Nat. Sci. Phila., 1858, x, 232.—DARWIN, Naturalist's Voyage

hang suspended from a tree for more than an hour, holding on to a stick which had been thrust between their claws. The wonderful stories about these crabs climbing the trees after cocoanuts are purely fictitious. They eat the nuts after they have fallen to the ground, first stripping off the husk, and then breaking through the shell at the end containing the eyes.

CRANGONIDÆ.

CRANGON FRANCISCORUM, *Stimp.*

Crangon franciscorum, STIMPSON, Proc. California Acad. Nat. Sci., 1856, i, 89; Jour. Boston Soc. Nat. Hist., 1857, vi, 495, pl. 22, f. 5; Crust. and Echin. Pacific coast of N. Amer., 55.

Locality: San Francisco Bay, California.

PALÆMONIDÆ.

HIPPOLYTE GIBBOSUS, *M. Edw.*

Hippolyte gibbosus, M. EDWARDS, Hist. Nat. des Crust., ii, 378.—DANA, U. S. Expl. Exped. Crust., i, 565, pl. 36, f. 4.—HELLER, Crust. Novara Exped., 120.

Locality: Hawaiian Islands.

There are seven teeth along the under margin of the rostrum, instead of six, which is the number given by Dana.

PALÆMON ACUTIROSTRIS, *Dana.*

Palæmon acutirostris, DANA, U. S. Expl. Exped. Crust., i, 590, pl. 39, f. 1.

Locality: Hawaiian Island.

SERGESTIDÆ.

SERGESTES MACROPHTHALMUS, *Stimp.*

Sergestes macrophthalmus, STIMPSON, Proc. Acad. Nat. Sci. Phila., 1860, xii, 46.

Locality: North Pacific Ocean.

There is no doubt about the identity of this species. It is very easily identified by the arrangement of the spines on the cephalothorax and abdomen. In addition to the supra-orbital and hepatic spines, there is one on the middle of the dorsal surface of the carapace, at its posterior extremity; this spine is small and erect. There is an oblique spine on the posterior dorsal extremity of the fourth, and of the fifth abdominal segments; that on the fourth is the larger. No other species of this genus presents this peculiar arrangement of dorsal spines. But Stimp-

son makes no mention of spines on the other segments of the abdomen. They were evidently broken off in his specimen, as they are on some of the segments of the present specimen, which, however, shows a greater number than he states to be present. No evidence of spines were seen on the first and second segments; but at the posterior extremity of the dorsal surface of the third is an erect spine, similar to the one on the posterior extremity of the carapace. The sixth segment has an oblique spine at its extremity, which is smaller than those on the two preceding segments. An unmutilated specimen will doubtless show the first and second segments to be armed with erect spines similar to that on the third, and on the extremity of the carapace.

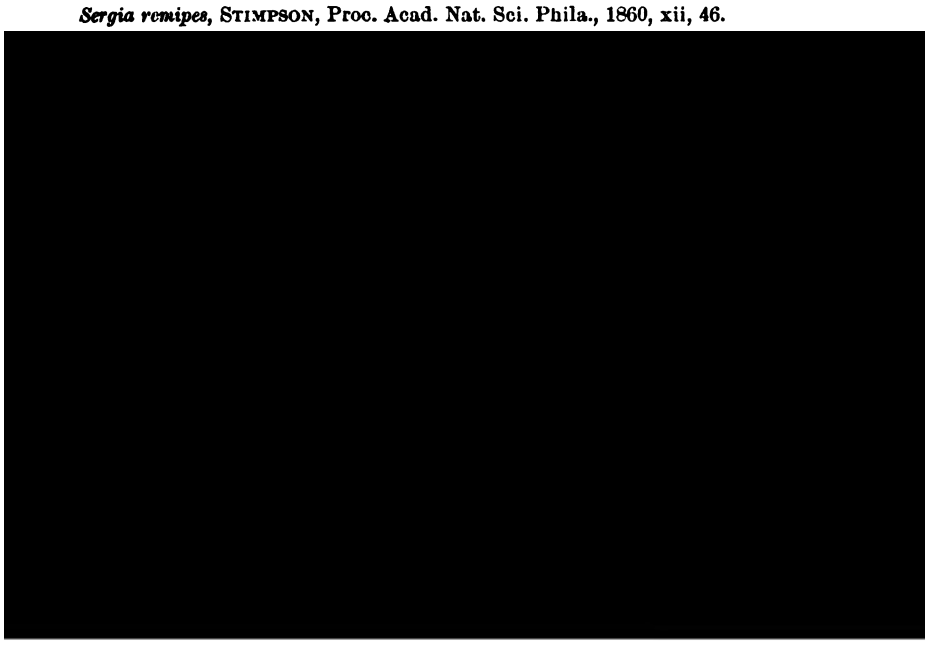
SERGIA, *Stimp.*

Sergia, STIMPSON, Proc. Acad. Nat. Sci. Phila., 1860, xii, 46.

In certain of its characters *Sergia* recalls *Lucifer*; while in others it is strongly related to *Sergestes*. Its own peculiar characters are in its fourth and fifth pairs of feet, which are long; and the dactylus is palmiform. Its body is elongated like *Lucifer*, but not so attenuated, and there is the same extension of the antennary segment anterior to the buccal region, which is carried to so great a degree in *Lucifer*. And again, as in the latter genus, there is a spheroidal auditory body imbedded in the base of the peduncle of the internal antennæ.

SERGIA REMIPES, *Stimp.*

Sergia remipes, STIMPSON, Proc. Acad. Nat. Sci. Phila., 1860, xii, 46.



The second and third pairs of external maxillipeds pediform, elongate; the three terminal joints of the second pair thickened, bent backward; the third pair very long, exceeding the length of the thoracic feet, and extending anteriorly to about the apex of the inner antennary peduncle. The maxillipeds, and the six anterior thoracic feet, furnished with long, simple setæ. The fourth and fifth pairs of thoracic feet slenderer than the preceding, cylindrical, more sparsely furnished with setæ; setæ plumulose; dactylus flattened, subovate; fifth pair shorter than the fourth; fourth almost as long as the carapace. Abdominal feet long and narrow; first pair nearly as long as the carapace; the length of the peduncle almost equals the length of the rami; the length of the feet decreases posteriorly, while the diameter of the peduncle increases; the margins of the rami densely covered with long, plumulose cilia. Abdomen longer than the cephalothorax; the five anterior segments subequal; the sixth long, equals the lengths of the fourth and fifth combined; fifth unarmed above; the posterior margin of the sixth, above and below, acute; inferior border furnished with long, plumulose cilia. The external margin of the outer caudal lamella armed with an aculeate spine near the posterior extremity. The margins of all the caudal appendages, except the external margin of the outer lamella anterior to the spine, furnished with long, equidistant, feathery cilia.

A comparison of the above description with that given by Stimpson shows that they agree in every particular, except in the length of the eyes—which he distinctly states reaches to the apex of the penultimate article of the antennary peduncle—and in the character of the front. Concerning the latter, he says, "rostrum minutely spinous, acute, curved, dorsum armed with a tooth or spine." Neither the spine nor the spiniform rostrum, are observable in the present specimen. The eyes were somewhat shrunken, and the front was probably mutilated in the surface tow-net in which the animal was caught. When the author states that the spines are minute, in a specimen only a half an inch long that requires a microscope to examine any part of its structure, they must be exceedingly small, and are very apt to be broken off by the rush of the water through the net. If these differences are found to be constant, this will constitute a distinct species; but I am not willing to found it upon the examination of a single specimen.

Locality: North Pacific Ocean.

Caught June 28, 1873, in latitude 30° north, longitde 145° west.

LUCIFERIDÆ.

LUCIFER ACESTRA, *Dana.*

Lucifer acestra, DANA, U. S. Expl. Exped. Crust., i, 671, pl. 44, f. 9.

Locality: North Pacific Ocean.

Male caught June 28, 1873, in latitude 30° north, longitude 146° west; female, May 9, 1873, in latitude 4° north, longitude 127° west.

After an examination of the genus *Sergia* there is no longer any doubt in my mind, that the place for *Lucifer* is with the lower Macrura rather than with the Schizopoda. The propriety of even elevating it to the dignity of a separate family is questionable.

I make the following addition to the characters already pointed out as distinguishing the sexes of this species. In the females the extremity of the internal margin of the outer caudal lamella projects beyond the apex of the spine at the extremity of the external margin; in the male this margin is not produced at all, but is truncated. The truncated surface is rounded, and slopes forward and inward from the base of the spine.

EUPHAUSIDÆ.

EUPHAUSIA GIBBOSA, n. sp.

Carapace short rostrate; rostrum broad, triangular, on a lower level than the superior surface of the carapace; the superior surface behind the rostrum gibbous, elevated slightly above the rest of the surface.

sixth abdominal segment as long as the two preceding; the caudal segment longer than the lamellæ; the two subapical barbs salient.

The tumid, hunched appearance of the anterior portion of the carapace, and the spines at the apices of the first and second basal joints of the inner antennæ, are characters which have not been mentioned in any previously-described species of this genus. They are very characteristic of this species, and will serve readily to distinguish it from all others.

Length, .45 of an inch.

Locality: North Pacific Ocean. Latitude 30° north; longitude 145° west. Caught June 28, 1873.

CYRTOPIA ROSTRATA, *Dana.*

Cyrtopia rostrata, DANA, U. S. Expl. Exped. Crust., i, 648, pl. 43, f. 2.

Locality: North Pacific Ocean. Latitude, 3° north; longitude, 128° west. Collected May 10, 1873.

Several specimens of this species were obtained, and they are all more rudimentary in form than that described by Dana. I failed to detect the slightest evidence of branchiæ. These organs were rudimentary in Dana's specimen; and in another genus—*Furcilia*, which is very closely allied, and more rudimentary still—they are entirely absent. In one instance the carapace was excavated behind, across the dorsum, as in the latter genus. All the specimens, but one, showed the apex of the first joint of the inner pair of antennæ prolonged at its outer and inner angle beyond the summit of the following joint, to about the same extent as it is carried in some species of *Furcilia*. The abdominal feet were rudimentary. The gibbous eyes, the long acute beak, and the anteriorly projecting tooth on the lateral border of the carapace were present in all. The facts cited above add greater weight to the testimony already adduced, that the place for Dana's provisional genus *Furcilia* is near *Cyrtopia*, in the family *Euphausidæ*.

MYSIDÆ.

MYSINÆ

SIRIELLA GRACILIS, *Dana.*

Siriella gracilis, DANA, U. S. Expl. Exped. Crust., i, 658, pl. 44, f. 1.

Locality: North Pacific Ocean. Latitudes 20° and 30° north; longitudes 149° and 145° west. Collected May 19 and June 28, 1873.

In all the specimens collected, the abdominal appendages were well developed, with stout oblong bases, and with two subequal, multiarticulate, ciliate rami, somewhat longer than the base. There is also present an oblong scale at the apex of the basal portion of the first pair of antennæ. Both these characters are said by Dana to be wanting; and their presence assimilates the genus more closely with *Promysis* and *Macromysis*.

COROPHIIDÆ.

CLYDONINÆ.

CLYDONIA LONGIPES, *Dana*.

Clydonia longipes, DANA, U. S. Expl. Exped. Crust., ii, 835, pl. 55, f. 7.—SP. BATE, Cat. Amphi. Crust., 284, pl. xlvii, f. 9.

Locality: North Pacific Ocean. The exact locality was lost.

The specimen in our collection is unmutilated; and, consequently, shows those parts intact that Dana stated were wanting in his. Concerning the antennæ, he says: "Only two were observed, and these were long, straight, stout, rigid organs, lying side by side, and, excepting the basal joints, hardly articulated, or only indistinctly so." The presence of but two antennæ was not an anomalous condition, but an accidental one, owing to mutilation. Commenting on the above statement, Sp. Bate says: "The author does not state which pair of antennæ are absent. The superior pair are probably rudimentary." Our specimen shows two pairs of antennæ occupying their normal positions, and

beneath the body. The apex of the flagellum reaches nearly to the posterior extremity of the cephalothorax when in this folded condition. The total length of the inferior pair is one-third greater than the superior pair.

The other parts that were mutilated in Dana's specimen were the posterior stylets. A description of these will therefore complete the account of the entire animal.

The outer caudal lamella are longer than the inner; both are lanceolate in shape, and serrated along their edges. The two stylets terminating the caudal segment are linear, and of the same length as the outer caudal lamellæ. Two short stylets articulate with the outer edge of the first just above the middle, and reach exactly half way to the terminal point. The fifth and sixth abdominal segments are much narrower than the preceding, and are apparently consolidated.

HYPERIDÆ.

HYPERINÆ.

LESTRIGONUS RUBESCENS, *Dana.*

Lestrigonus rubescens, DANA, U. S. Expl. Exped. Crust., ii, 984, pl. 67, f. 9.—SP. BATE, Cat. Amphi. Crust., 290, pl. xlviii, f. 5.

Locality: North Pacific Ocean. Latitude 1° north; longitude 122° west. Collected May 7, 1873.

My reasons for retaining the genus *Lestrigonus* will be given under *Hyperia tricuspidata.*

HYPERIA TRICUSPIDATA, n. sp.

Head large, deeper than broad, irregularly quadrangular from a lateral view, excavated in front. Eyes large, occupying most of the lateral portion of the head. Superior antennæ shorter than the head, stout; base short, four-jointed; first joint longest, distal end enlarged; the second, third, and fourth short, together shorter than the first; flagellum broader than the peduncle, oval, acute at the apex, about three times as long as the base, uniarticulate; a few long auditory cilia at apex; a single row of short hairs on the inferior surface. Inferior antennæ rise from the inferior portion of the head, near the buccal region; more than twice as long as the superior pair; peduncle four-jointed; first and second joints long; first about half the length of the second, extending to the anterior margin of the head, but not exposed beyond it; second joint

slender, cylindrical, and the entire length of its upper border closely set with short, equidistant hairs, curled at their tips; third and fourth joints short, subequal, about one-quarter the length of the second, a few hairs on their upper surface; flagellum linear-lanceolate, in length almost equal to the second joint of the base, uniarticulate, pointed, with seven or eight slight serrations along the superior edge, one or more hairs at each serration. The second joint is directed upward and outward, and the third, fourth, and flagellum are bent downward, nearly at a right angle with the second. When the animal is at rest, the inferior antennæ are evidently folded up, in this manner, in the concavity in the front of the head.

The two pairs of gnathopoda unequal and unlike; the first pair shorter, and more robust than the second; meros produced antero-inferiorly, at its extremity a number of stiff hairs, slightly curled at their tips; carpus broad, produced inferiorly, but not anteriorly, with its anterior edge straight, and armed at the inferior angle with two stout spines or bristles; propodus shorter than the carpus, and about one-half as broad; dactylus very minute. The second pair has none of the joints produced; meros short, about one-fourth the length of the carpus; the latter slender and cylindrical; propodus shorter than the carpus, and about the same breadth, with its distal extremity slightly produced on either side of the dactylus to an acute point, which is almost as long as the short dactylus. This arrangement probably compensates for the lack of the subchelate development of the carpus.

The depth of the thorax decreases slightly posteriorly. The five

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the essential specific character that immediately distinguishes *H. tricuspidata* from all others of the same genus; namely, the peculiar structure of the second pair of gnathopoda. The head is larger in the female, but the general shape is the same; the thorax is shorter and deeper, and the last segment is much narrower; the abdomen is also narrower. The character of the superior antennæ is the same in both, except that in the female they are much smaller, and the joints are more plainly visible. The inferior antennæ, however, are quite different. They do not extend at all, or very slightly, beyond the anterior margin of the head. The first basal joint is very short, and broader than the following; the second long, and reaches nearly to the anterior margin of the head; the third joint is rudimentary; and the fourth is apparently obsolete. The flagellum is small, about one-third the length of the first joint, lanceolate in shape, and with two or three stout cilia at its apex. The shortening is chiefly due to the diminished length of the first joint of the peduncle. The posterior pair of thoracic legs are slenderer and shorter than the preceding pairs. The peduncles of the anterior abdominal appendages are ovate, instead of being elliptical; the posterior appendages show no differences.

Length of male .30 inch; of female, .25 inch.

I cannot think that these differences are anything more than sexual, on account of the strong specific resemblance there is between the specimens. Carcinologists generally have adopted the conclusion that *Lestrigonus* is the male sex of *Hyperia*, but at no time, I think, has there been sufficient evidence at hand to justify this conclusion. I know no better reason for the supposition, than that they are occasionally found associated together, joined with the fact that certain others of the *Hyperidea* show a similar sexual difference; namely, in the length of the antennæ. In the *Lestrigonus*, however, there is not only a difference in the length, but a total change in the structure of the antennæ. What is here held to be a male bears no resemblance to a *Lestrigonus*, but has all the generic characters of a *Hyperia;* and, while there is a modified growth, as in the former genus, the development of the antennæ is the same in both individuals.

Young.—Head narrow, quadrilateral. Superior antennæ short and stout, and situated nearer the superior margin of the head than in the adult; the first basal joint as long as the three terminal ones; the second longer than the third, and their breadth less than that of the first; the fourth joint small, and either rounded or broadly triangular, with

rounded apex; flagellum minute, linear, uniarticulate, with one or two cilia crowning the apex, as long as, or longer than, the flagellum. The inferior antennæ are represented by a small rounded tubercle, tipped by a cilia; situated just beneath the superior pair.

Thoracic feet ten in number, stout; claws strongly hooked. Gnathopoda rudimentary, neither pair produced at the carpus, or at the meros; readily distinguished from the following thoracic feet by their more slender development.

Locality: North Pacific Ocean.

VIBILINÆ.

VIBILIA EDWARDSI, *Sp. Bate.*

Vibilia edwardsi, Sp. Bate, Cat. Amphi. Crust., 300, pl. xlix, figs. 6 and 7.

Locality: North Pacific Ocean. Latitude 4° north; longitude 127° west. Collected May 9, 1873.

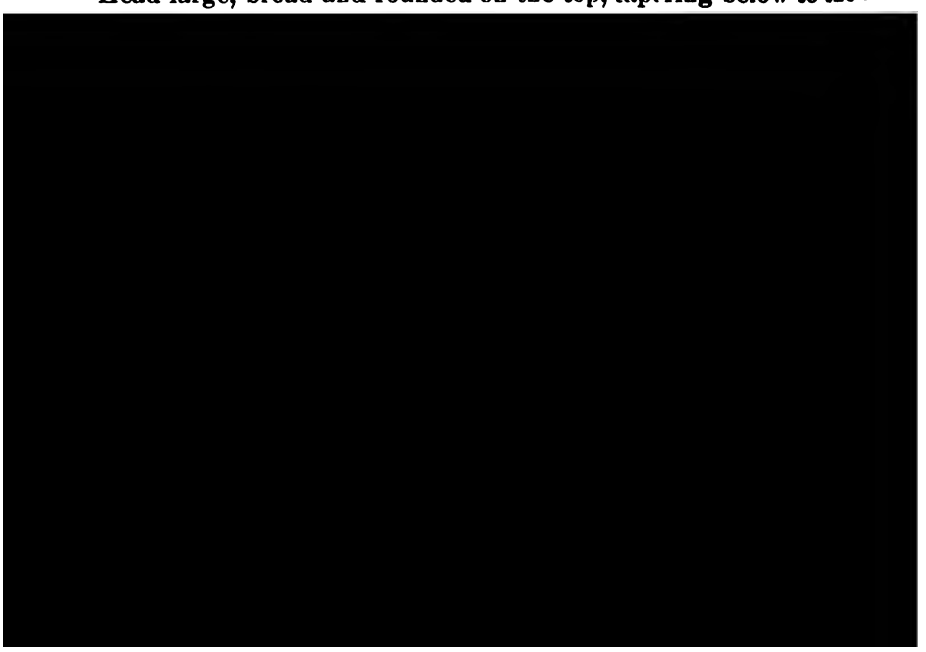
The flagellum of the superior antennæ, with its anterior margin oblique, and fringed with a row of short spines, is highly characteristic of this species.

PHRONIMIDÆ.

PHRONIMINÆ.

PHRONIMA PACIFICA, n. sp.

Head large, broad and rounded on the top, tapering below to the oral



ing toward the distal extremity, finely serrated on the inferior surface, and three or four longer spines on the superior surface; dactylos short, about one-fourth the length of the propodos, curved, and notched on the under surface, posterior to the apex; on either side of the base is a wing-like plate. The second pair of gnathopoda longer than the first pair, and the antero-inferior angle not produced to the same extent; in other respects they are similar. The first pair of thoracic feet shorter than the second, and much longer than the gnathopoda; the posterior margin of the carpus and propodus of both pairs minutely spinulose; dactylus minute. The third pair chelately developed; carpus large, irregularly quadrilateral, almost as broad as long, the inferior surface rounded, and the antero-inferior angle produced as a long tooth; on the middle of the anterior surface is a large crenulated tubercle, from which rise five or six long, straight hairs. In specimens from the .15 to the .20 of an inch long, there are, in the position of the tubercle, two or three sharp, prominent teeth, springing from a slightly-raised base; and the angle of the carpus is less projecting in the same specimens. Propodus bowed; when flexed on the carpus reaching to the apex of the tooth at the inferior angle—in smaller specimens somewhat longer; a low convexity on the inferior surface opposite the crenulated tubercle of the carpus; the prominence not crenulated; inferior surface bimarginate. Dactylus present, minute. The posterior apex of the coxa of the third pair acute, prominent; the meros projecting posteriorly and rounded. The two posterior pairs of thoracic feet subequal, shorter than any of the preceding pairs. Telson rudimentary.

Length of the larger specimens, .40; smaller, .15 of an inch.

Locality: North Pacific Ocean. Latitudes 4° and 21° north; longitudes 127° and 151° west. Collected May 9 and 20, 1873.

This species is distinguished from *P. sedentaria* by the broadly-quadrate form of the carpus of the third pair of thoracic feet, and by having the carpus of the gnathopoda less produced anteriorly. In other respects they are similar. The shape of the hand more nearly resembles the hands of *P. custos* and *P. borneensis*; but it is distinguished from both of the latter, by the character of the anterior surface of the carpus and of the propodus. In the latter both the carpus and propodus are furnished with a crenulated tubercle; in *custos* the tubercle is single and tooth-like. There is a striking resemblance between the propodus, and the anterior surface of the carpus of the third pair of thoracic feet, of the smaller specimens of *pacifica*, and the corresponding parts of *P.*

atlantica, which is said to be the female of *sedentaria;* the broad hand, however, separates them.

It is a remarkable fact, that in all the species of *Phronima* that have been described, even from widely-separated localities, the variation is very slight indeed.

ANCHYLONYX, nov. gen.

Head moderately large, broad and rounded at the top, tapering inferiorly to the oral apparatus, and excavated in front. Eyes on the lateral and dorsal surfaces of the head. Both pairs of antennæ present, long; base of the superior pair long and stout, three-jointed; inferior pair slender, four-jointed; flagellum very attenuated and elongated. Thorax broad, somewhat compressed; segments six. Abdomen narrow. The gnathopoda not subchelate, nor much reduced in size, when compared with the following feet; the first and second pairs of thoracic feet long, slender; carpus and meros linear. The third pair enlarged; carpus and meros dilated, with the anterior margin armed with teeth; propodus flexes on the carpus, impinging against the teeth on its anterior margin; dactylus fused with the propodus. The fourth and fifth pairs of feet subequal, shorter than the preceding. The three posterior pairs of abdominal appendages biramous, lanceolate; rami pointed.

This genus is very closely allied to *Phronima*. It differs only in the character of the antennæ, the gnathopoda, and in the less perfectly developed chelæ of the third pair of thoracic feet. The shape of the head, the thorax, and the abdomen are almost identical, and there are likewise eye-facets on the dorsal surface of the head. The mandibles are without appendages; and the first and second, and the fourth and fifth pairs of thoracic feet are similar to those of the genus above named, as are also the three posterior pairs of abdominal appendages. A pair of wing-like plates exist at the base of the dactylus of both pairs of gnathopoda. These, I believe, have previously been peculiar to *Phronima*. The character of the gnathopoda and the third pair of thoracic feet allies the genus with *Primno;* in the structure of its antennæ it differs essentially from both.

Anchylonyx forms a bond of union between the two subfamilies of Bate's—the PHRONIMIDES and PHROSIMIDES, which are founded upon the structure of the three posterior pairs of abdominal appendages in the different genera representing the family PHRONIMIDÆ. In his arrangement he separates *Primno* from *Phronima*, which, together, con-

stitute Dana's subfamily PHRONIMINÆ. The fact that the two genera come together again, and mingle their characters in *Anchylonyx*, rather proves that the position which Dana assigned to them is the correct one, and that the characters which he used for the subdivision of the family are of more importance, than those adopted by Bate.

ANCHYLONYX HAMATUS, n. sp.

Head of moderate size, rounded above and pointed below, deeply concave in front. The lateral lenses of the eye arranged in the form of a rosette, and situated in a rounded projection on the lower portion of the head, directly above the origin of the inferior antennæ. A number of solitary lenses scattered over the lateral and dorsal surfaces of the head, and connected by long and filamentous nerve-fibers with the inferior eyes. The superior antennæ nearly as long as the cephalothorax; first joint of base short and broad; second extremely short, about one-third the length of the first; third joint slightly longer than the head, lanceolate, inferior edge densely hairy, apex inferiorly produced; first and second joints of the flagellum subequal, together about as long as the third; third and fourth subequal; remainder of flagellum lost. Inferior antennæ more slender than the superior pair, very long; flagellum very much attenuated, filamentous, one-half, or more than one-half, the length of the body; peduncle four-jointed—three of which are exposed beyond the anterior margin of the head; first joint short and broad; second longer than the rest, slightly oval; fourth narrower, bent slightly upward; joints of flagellum elongate—the first the longest; the remainder subequal. The under surface of the flagella of both pairs furnished with long, equidistant hairs.

Segments of the thorax six; the first and second soldered together; the five anterior subequal; the sixth (the seventh normal) narrows posteriorly, and is nearly as long as the two preceding. First pair of gnathopoda shorter and slenderer than the second; meros of the same length as the preceding joint, slightly produced inferiorly at the distal extremity—the produced portion finely serrated below and anteriorly, at the angle one of the serrulations produced to a fine acicular spine; carpus long, at inferior apex a slender spine; propodos somewhat shorter than the carpus, arched; dactylus about one-half the length of the propodos, arched, acute, notched below the apex, with a wing-like plate on either side of base. The carpal and meral joints of the second pair of gnathopoda neither produced, nor spiniferous; dactylus less than one-half the length of the

propodos; with these exceptions the second pair is similar to the first. First and second pairs of thoracic feet longer than the third; the first pair longer than the second; the external surface of the coxæ ridged along the middle, with posterior angles acute, spinous; all the joints narrow and elongate; claw anchylosed with the tarsus, and fixed at a right angle to it; the apex of the tarsus produced in the form of a long, straight, acute spine. The third pair of thoracic feet enlarged, more robust than the others, with coxa ridged on the middle of the external surface, and with the anterior and posterior margins armed with short, stout spines; meros slender, convex posteriorly, and anteriorly concave; anterior surfaces of the carpus and meros armed with long, sharp teeth—three on the latter, and seven on the former; the fifth tooth, counting from the base oft he carpus, much larger and longer than the others; carpus somewhat clavate in shape, the anterior extremity enlarged; propodus about half the length of the carpus, arched; dactylus small, anchylosed, fixed at a right angle to the propodos. Fourth and fifth pairs of feet sub-equal, shorter than the preceding, with the anterior angles of coxæ spinous; in other respects similar to the preceding.

Abdomen narrow; the three anterior segments gradually diminishing in length posteriorly; the fourth very narrow. The peduncles of the anterior appendages broadly oval; the rami short and slender, multiarticulate; the posterior appendages slender, lanceolate, biramous, acute; the outer pair extending half way the rami of the terminal pair; the inner pair short, terminating at the commencement of the rami of the outer pair. Telson minute, rudimentary.

Length, .40 of an inch.

Locality: North Pacific Ocean. Latitude 34° north; longitude 150° west. Collected June 25, 1873.

PHROSININÆ.

ANCHYLOMERA THYROPODA, *Dana.*

Anchylomera thyropoda, DANA, U. S. Expl. Exped. Crust., ii, 1004, pl. 68, f. 10.—SP. BA[illegible] Cat. Amphi. Crust., 325, pl. lii, f. 6.

Locality: North Pacific Ocean.

I identify this species with Dana's, which came from the Atlan[illegible] Ocean, on account of the peculiar form of the antennæ. These orga[illegible] are curved downward and outward, and are closely applied to the s[illegible] face of the head. In one specimen the antennæ were absent altogethe[illegible]

and I, therefore, do not believe their small size and peculiar form to be due to age; their presence is rather a sexual characteristic.

The inferior distal angle of the propodos of the third and fourth pairs of thoracic feet is produced, and when the joint is flexed this projection impinges against the antero-inferior angle of the carpus. This character is not mentioned in Dana's description. In other respects they are almost identical.

Length, .10 to .15 of an inch.

PLATYSCELIDÆ.

PLATYSCELUS BATEI, n. sp.

Head, when viewed from above, broadly rounded; the center of the anterior margin produced in the form of a beak, which is directed downward. The peduncle of the superior antennæ truncated; the inferior distal extremity furnished with two bunches of auditory cilia, one posterior to the other; flagellum two-jointed. Inferior antennæ short, four-jointed; first joint the longest; second and third subequal; fourth joint broadly rounded at apex, longer than the third; terminating in a minute flagellum, acute and curved at the apex, and base broader. The whole antenna is concealed beneath the lateral portion of the head. The thorax narrower at either extremity than in the middle, somewhat barrel-shaped when seen from above; first and second segment short, almost concealed in the middle of the dorsum by the overriding of the third. The first pair of gnathopoda shorter and slightly stouter than the second; in other respects they are similar; shorter and more robust than the following thoracic feet; neither carpi nor mera produced anteriorly, the latter broader than the former, neither serrated; the inferior margins furnished with a few long setæ; propoda about the same length as the carpi, narrower, cylindrical, not serrated; dactyla short. The first pair of thoracic feet shorter than the second; coxæ of both pairs elongate, somewhat clavate; the mera, carpi, and propoda subequally long; dactyla short, curved. Coxa of third pair subelliptical, not serrated; apex obtusely rounded; anterior margin furnished with five or six short, equidistant setæ; the remaining five joints articulating with coxa subapically, together as long as the coxa; at the inferior apex of the third joint is a single long seta. Coxa of the fourth pair broad, arcuate posteriorly, and excavate anteriorly; distal extremity obtusely rounded at the apex,

and oblique posteriorly; the ischium short, articulating with tl terior margin of coxa near the center, and opposite the angle for the posterior oblique margin; the remaining joints about one-tl length of the coxa; the first joint following the ischium longer tl three terminal ones; the inferior margin produced anteriorly; a serrated on the posterior margin. Of the fifth pair the co: developed; membranous, broad, about one-third the length of t of the fourth pair. Abdomen narrower than the thorax; segmen nally decreasing in breadth posteriorly; longer than the thora ments. Posterior abdominal appendages foliaceous, biramo details of their structure similar to those of *P. rissoinæ*. Telson triangular, apex obtuse.

Length, .12 of an inch.

Locality: North Pacific Ocean. Latitude 21° north; longitu west. Collected May 20, 1873.

This species is closely related to *P. rissoinæ;* the differences ar in the structure of the gnathopoda, and of the third and fourth thoracic feet. The gnathopoda bear a striking resemblance to the young of *P. serratus*, but as the rest of the structure of the shows no evidence of immature development, this is undoubte normal adult condition.

I dedicate the species to the eminent English carcinologist, C Bate, who, more than any other writer on the subject, has helpe cidate this order of Crustacea.

creasing in length posteriorly. First pair of gnathopoda having the meros broad distally; carpus broad, antero-inferiorly produced nearly to the apex of the propodos; the apex of the produced portion obtuse, finely serrulated on both margins; propodos oblong-ovate, slightly longer than the produced angle of the carpus, inferior margin serrulated; dactylus short. Second pair of gnathopoda longer than the first; carpus produced inferiorly, but not anteriorly; antero-inferior angle obliquely rounded and sharply serrated; propodos longer than the carpus, the superior margin arcuate, inferiorly straight, not serrated; dactylus half the length of propodos, slender, arcuate. First and second pairs of thoracic feet long, all the joints following the coxæ closely serrated along their flexible margins; claws long, slender, acute, almost as long as the preceding joint. Third pair having coxa dilated, and anterior margin nearly straight, the posterior broadly convex; the remaining joints, resembling the corresponding joints of the first and second pairs, longer than the coxa, and articulating with its apex near the anterior angle. Fourth pair having the coxa more dilated than the third, form similar; the remaining joints shorter than the coxa, but with the flexible margins serrated like the preceding pairs; the coxa of the fifth pair broad, much smaller than the two preceding; ischium rudimentary; the remaining joints obsolete. Segments of the abdomen much longer than those of the thorax, decreasing in length and breadth posteriorly; the posterior lateral angles of the three anterior segments produced, acute; the fourth and fifth segments do not coalesce; the fifth is extremely abbreviated, but distinct; on account of its small size the antepenultimate and penultimate caudal lamellæ appear to rise together from the postero-inferior angle of the fourth segment, but in reality they do not; the penultimate pair rises from the fifth; these lamellæ are subequal, with peduncles short and rami long, extending almost to the extremity of the ultimate pair, ovate-lanceolate, acutely serrated on both margins; peduncles of ultimate pair very short, rami similar to the preceding, extending a short distance beyond the extremity of the telson. The latter triangular, apex obtuse.

Length, .15 of an inch.

Locality: North Pacific Ocean. Latitude 21° north; longitude 151° west. Collected May 20, 1873.

OXYCEPHALIDÆ.

OXYCEPHALUS TUBERCULATUS, *Sp. Bate.*

Oxycephalus tuberculatus, Sp. Bate, Cat. Amphi. Crust., 343, pl. liv, f. 5.

Locality: North Pacific Ocean. Latitude 5° north; longitude 128° west. Collected May 10, 1873.

Although taken in a widely-distant locality, there is no doubt of the identity of this species with that described by Bate. The row of dorsal tubercles, one anterior and one posterior, on each segment of the body, the structure of the second pair of gnathopoda, and the rudimentary character of the posterior pair of thoracic legs—falling short of the base of the preceding pair—at once determines the species. They also agree in the minor details of structure, as far as they are given by the author. The head and first thoracic segment were wanting in his specimen. I will therefore supply the omission in his description by an account of the parts as they exist in the present specimen.

Head not quite as long as the first five segments of the thorax, broad, inferior margin broadly convex; rostrum more than half the length of the head, triangular, acute; eyes large, covering the whole of the lateral surfaces of the head; the superior antennæ broad, compressed; peduncle three-jointed; first joint longer than the second; the latter short; the third longer than the first and second, and having on the upper surface near the apex a few auditory cilia; flagellum uniarticulate, short, slender, slightly bent upward, and apex furnished with a few long auditory cilia. Inferior antennæ absent in the specimen. The first pair of gnathopoda

selves four times, and concealed beneath the head; first and second joints distally enlarged. An elongate mandibular appendage. Gnathopoda short, and complexly chelate. Third and fourth pairs of thoracic feet having the coxæ dilated; the fifth pair small. Fourth and fifth abdominal segments fused into one; sixth small. Caudal appendages long, biramous. Telson cylindrical, long.

This genus exhibits a remarkable blending of the characters of *Oxycephalus* and *Rhabdosoma*. The general form of the animal is that of *Oxycephalus*; the short neck and elongated rostrum show a tendency toward *Rhabdosoma*. Both pairs of antennæ, the abdomen, and caudal appendages are identical with the corresponding parts in the latter genus; while the three posterior thoracic feet are a repetition of the former. A similarly elongated mandibular appendage is observed in *Rhabdosoma whitei*.

LEPTOCOTIS SPINIFERA, n. sp.

Head long, with the rostrum longer than the thorax; vertical diameter of the head greater posteriorly than anteriorly; the superior surface on a higher level than the dorsum of the thorax; abruptly constricted behind the eyes and in front of the first thoracic segment; the inferior border slightly convex; the under surface hollowed out on each side anteriorly in the form of fossæ for the reception of the superior antennæ; supra-fossal margin arched and slightly elevated; rostrum long, acute, slightly arched. Eyes covering the whole of the lateral and dorsal surfaces of the head posterior to the superior antennæ. Superior antennæ sickle-shaped; peduncle broad, three-jointed, with margins densely hairy, particularly the inferior margin; second joint short; the third longer than the first and second together, compressed, bent forward at its articulation with the second joint, and its anterior inner apex produced as a long, acute process, which is almost at a right angle with the main portion of the joint; base of process enlarged; flagellum articulating with the anterior surface of the base of the process, and shorter than the process, biarticulate, each articulus having three or four long auditory cilia. Inferior antennæ five-jointed, folded upon themselves four times, and hidden in a groove on the under surface of the head; the first, second, and third joints equal in length; the first and second enlarged at their distal extremities; fourth joint a little shorter than the preceding; fifth very short, with one or two auditory cilia at its apex. The mandibular appendage long, slender,

reaching nearly to the apex of the first joint of the inferior antennæ; first joint long; second and third short.

Thorax seven-jointed; segments increasing in length posteriorly; epimerals long, broadly ovate, transversely rugose. Gnathopoda short, chelate; the second pair longer than the first; carpus of first pair scarcely produced anteriorly, anteriorly and inferiorly serrated; propodos broad, serrated on inferior margin; dactylus half the length of the propodos, arched, with a minute spine about the middle of the inferior surface, antagonizing with the extremity of the carpus. Second pair having the carpus more produced anteriorly than the first, extending to, or slightly beyond, the apex of the propodos, and terminating in a long, fine point; propodos and dactylus similar to the first pair. First and second pairs of thoracic feet shorter than the third, slender; third and fourth pairs having the coxæ dilated; the fourth more dilated than the third, and the remaining joints shorter, and closely serrated along the entire anterior margin—the first joint coarsely serrated, the next finely, and the third intermediate between the two preceding—the other feet not serrated; fifth pair rudimentary, coxa dilated, small, with the remaining joints not half as long as the coxa of the preceding pair.

Abdomen having the three anterior segments normal, subequal; fourth and fifth fused into one; sixth short; the dorsal surface of each segment marked by a shallow, transverse depression near the anterior extremity of the joint; that on the fourth segment deeper than those preceding it; a long, acute spine, pointing upward, on each side of the

CALANUS MUNDUS, *Dana.*

Calanus mundus, DANA, U. S. Expl. Expd. Crust., ii, 1071, pl. 74, f. 2.

Locality: North Pacific Ocean. Latitude 21° north; longitude 153° west. Collected May 21, 1873.

The specimens of *C. mundus* were taken at the same time with the *C. sanguineus*. A similar statement is made by Dana. The differences pointed out by that writer were observable in the present specimens, yet they probably have a closer relationship than he gives to them.

EUCALANUS ELONGATUS, *Streets.*

Calanus elongatus, DANA, U. S. Expl. Exped. Crust., ii, 1079, pl. 75, f. 1.

Locality: North Pacific Ocean. Latitude 1° north; longitude 122° west. Collected May 7, 1873.

The general shape of *E. elongatus* and *E. attenuatus* is so very different from the form of the typical *Calanus*, that I think we are justified in considering them under a distinct generic title. I adopt that which Dana suggested for *attenuatus*, in consequence of "the multiarticulate character of the smaller branch of the posterior antennæ." This character, I am disposed to believe, belongs to *elongatus* as well as to *attenuatus*; at least, a specimen examined by me shows unmistakable evidence of it.

PONTELLINÆ.

CANDACE ETHIOPICA, *Dana.*

Candace ethiopica, DANA, U. S. Expl. Exped. Crust., ii, 1115, pl. 78, f. 5.

Locality: North Pacific Ocean. Latitude 21° north; longitude 153° west. Collected May 21, 1873.

Our specimens differ from Dana's *ethiopica* in some respects, but they evidently do not constitute a new species. The cephalothorax is five-jointed, instead of four, the second joint being short; the right posterior angle of the last joint has a minute projection on its outer side near the apex. This projection was not observed on the left side, and it was only present in the single male specimen. The sixteenth joint of the anterior antennæ, or that one following the geniculation, presents both extremities closely pectinated, while there is a short space in the middle that is bare; the proximal extremity of the following joint shows a few short pectinations. The abdomen is five- or six-jointed, and on the right side of the first segment is an acute spinous process, black at the tip.

The female presents the following differences. There is no geniculation, nor pectinations, on the right anterior antenna; the acute posterior angles of the cephalothorax are produced equally, and bent slightly outward, the right not black at the tip. The abdomen is four-jointed; the second joint is the largest, rounded laterally and gibbous below, and the posterior lateral angle on each side is produced into short acute processes; in the center of the protuberance below is a deep black spot.

It will be observed that some of the characters mentioned above belong to *Candace curta*. The females show a decided likeness to the same sex of *C. pachydactyla*. The only difference of any importance that I can see in the three species, is in the structure of the right posterior foot of the male. Future research will probably determine them to be but a single species with individual variations. The structure of the right anterior antenna of the male is a strong specific character.

PONTELLINA DETRUNCATA, *Dana*.

Pontellina detruncata, DANA, U. S. Expl. Exped. Crust., ii, 1143, pl. 80, f. 7.

Locality: South Pacific Ocean. Latitude 10° south; longitude 110° west. Collected May 1, 1873.

PONTELLA FERA, *Dana*.

Pontella fera, DANA, U. S. Expl. Exped. Crust., ii, 1169, pl. 82, f. 5.

Locality: South Pacific Ocean. Latitude 23° south; longitude 94° west. Collected April 24, 1873. Specimen male.

COPILIA MIRABILIS, *Dana.*

Copilia mirabilis, DANA, U. S. Expl. Exped. Crust., ii, 1232, pl. 86, f. 14.

Locality: South Pacific Ocean. Latitude 8° south; longitude 113° west. Collected May 2, 1873.

The cephalothorax increases in breadth behind the conspicilla to about the middle of the first segment, where there is a slight angle. Posterior to this angle, the sides of the segment are very nearly parallel. Abdomen is five-jointed. The first and second articulations are nearly obsolete; the third and fourth distinct. The posterior extremities of the third and fourth joints are surrounded by a ring of minute spines; the fifth joint is slender, longer than all the preceding together; at each outer angle of the posterior extremity of the fifth joint is a short spine, and likewise one above and one below on each side. The caudal stylets are long and divergent, with a short, slender seta on their outer margin at the junction of the upper-fourth with the lower three-fourths of their length; the extremity is furnished with four setæ, those at the angles short and slender; the two middle ones long and stout.

SAPPHIRINA CORUSCANS, *Dana.*

Sapphirina coruscans, DANA, U. S. Expl. Exped. Crust., ii, 1243, pl. 87, f. 6.

Locality: North Pacific Ocean. Latitude 1° north; longitude 122° west. Collected May 7, 1873.

Body ten-jointed; the tenth small, concealed beneath the ninth. Caudal lamellæ having a tooth on the inner side near the apex. In this latter character it resembles *S. orientalis* and *S. ovalis*.

BOTANY.*

Plants of the Pacific Islands.

CRUCIFERÆ.

LEPIDIUM OAHUENSE, *Cham. & Schlecht.*

Localities: Palmyra and Washington Islands. Common.

MALVACEÆ.

SIDA DIELLI, *Gray.*

Locality: Christmas Island.

ZYGOPHYLLACEÆ.

TRIBULUS CISTOIDES, *Linn.*

Locality: Christmas Island.

SIMARUBACEÆ.

SURIANA MARITIMA, *Linn.*

[redacted]

GOODENOVIACEÆ.

SCÆVOLA PLUMIERA, *Vahl.*

Locality: Christmas Island. A low, spreading shrub, branching from the ground. Flowers white, with purple edges; resembling the flower of a *Lobeliaceæ.*

BORRAGINACEÆ.

HELIOTROPIUM ANOMOLUM, *Hook. & Arn.*

Locality: Christmas Island.

NYCTAGENIACEÆ.

BOERHAAVIA HIRSUTA, *Linn.*

Locality: Christmas Island.

CYPERACEÆ.

SCIRPUS RIPARIUS.

Locality: Washington Island. Covering the surface of the shallow fresh-water lagoons of that island.

FILICES.

POLYPODIUM AUREUM, *Sw.*

Localities: Palmyra and Washington Islands. Common.

PTERIS AQUILINA, var. CAUDATA, *Linn*

Locality: Oahu.

ASPLENIUM NIDUS, *Linn.*

Localities: Palmyra and Washington Islands. Very abundant on the windward side of the former.

ASPLENIUM POLYPODIOIDES, *Mett.*

Locality: Oahu.

NEPHROLEPIS EXALTATA, *Schott.*

Locality: Washington Island. Not growing on Palmyra.

DAVALLIA TENUIFOLIA, *Sw.*

Locality: Oahu.

DAVALLIA SPELUNCEA, *Baker.*

Locality: Oahu.

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[redacted]

Department of the Interior:

U. S NATIONAL MUSEUM.

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BULLETIN

OF THE

ITED STATES NATIONAL MUSEUM.

NO. 8.—INDEX TO THE NAMES WHICH HAVE BEEN APPLIED TO THE SUBDIVISIONS OF THE CLASS BRACHIOPODA.

BY

W. H. DALL.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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NITED STATES NATIONAL MUSEU

No. 8.

PUBLISHED UNDER THE DIRECTION OF THE SMITHSONIAN INSTITUTION.

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1877.

ADVERTISEMENT.

This work is the eighth of a series of papers intended to illustrate the collections of natural history and ethnology belonging to the United States and constituting the National Museum, of which the Smithsonian Institution was placed in charge by the act of Congress of August 10, 1846.

It has been prepared at the request of the Institution, and printed by authority of the honorable Secretary of the Interior.

JOSEPH HENRY,
Secretary of the Smithsonian Institution.

SMITHSONIAN INSTITUTION,
Washington, May, 1877.

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TO THE

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EXCLUDING THE RUDISTES

PREVIOUS TO THE YEAR 1877.

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W. H. DALL,
U. S. COAST SURVEY.

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INDEX OF NAMES APPLIED TO THE CLASS, ORDERS, TRIBES, FAMILIES, GENERA, SUB-GENERA, AND SECTIONS OF THE BRACHIOPODA (EXCLUDING THE RUDISTES) PREVIOUS TO THE YEAR 1877.

By W. H. Dall,
United States Coast Survey.

INTRODUCTION.

The names herein enumerated comprise all the appellations which have been given to the various divisions of the *Brachiopoda* as far as they could be collected from the works accessible to me. It is believed that the list is nearly complete so far as relates to names applied under the Linnæan system of nomenclature.

Non-binomial and pre-Linnæan names which have been quoted in synonymy, errors of pen or types, and groups of similar appellation, but differing in scope, have all been included so far as they are to be found in the standard works on the subject. The number of names due to typographical errors could have been largely increased had reference been made to minor papers and publications, but this was not thought necessary or desirable. Since some, and in fact most, of those indexed have been quoted or printed in standard works on the subject, it would have been inadvisable to have omitted them entirely.

The object of the index is rather to enable students to construct their own synonymy, according to such rules of nomenclature as they may prefer, than to attempt a wholesale revision here. On this account, the references have been freed, whenever possible, from expressions of individual opinion, and are intended to convey an exact idea of the facts. The notes which follow the references as explanatory matter are framed in accordance with the original rules of the British Association, excepting that the date of the proposition of the Linnæan nomenclature is taken as from the tenth edition of the *Systema Naturæ*, where (in my opinion) it properly belongs, instead of the twelfth edition, as originally proposed by the association committee. This differ-

ence would affect but one or two unimportant names among those in the index, and would seem to be a necessary concession to a simple matter of fact.

The absolute synonymes resulting from the foundation of different genera on the same species, and some which are generally admitted by the majority of authors, have been indicated whenever known. In some cases, the compiler has exercised his own judgment in inserting a reference to synonymy. In every case, however, the student is requested to refer to the citations of the index, upon which the compiler's indications of synonymy are based, and from them to form his own conclusions.

It has been attempted to give in full the *locus*, date, and reference to figures (if any) appertaining to each original generic or other description; with a reference to the original description of the typical species, when this is not coincident with the generic or sectional diagnosis, to indicate whether a diagnosis authenticated the introduction of a new name or not (silence on this point in the citation indicating that a proper diagnosis was made); to name and give citations for the type, if any was selected, or to state the first species if no type was named, and the types which have been adopted by subsequent students of the genus; and to give a reference to the best figure of the typical species known to the compiler.

This has been done whenever practicable, and a reference to the geological horizon of the type-species of a genus, with any notes which might tend to elucidate its standing, have frequently been added.

Nearly all the works referred to have actually been consulted. The only important exceptions are those of Fischer de Waldheim, König and one of Pander's minor papers. For an opportunity of consulting Pander's Beiträge I am indebted to the kindness of Prof. Alexander Agassiz, director of the Museum of Comparative Zoölogy at Cambridge.

When a publication was inaccessible, the fact is stated in the citation, which has then been derived from the works of Davidson, Bronn, Hermannsen, and other standard authorities. To the first-named gentleman and Prof. R. P. Whitfield, of Albany, I am under great obligations for numerous favors received during the preparation of this index, for the views expressed in which, however, I hold myself solely responsible.

The classification of generic names which follows the index is for the purpose of assisting the student to find at one reference all the binomial names which appear to belong to any one family. Some pre-Linnæan

names which have been widely quoted are also included. It must be kept in mind, however, that this classification is purely tentative, and that, with the exception of absolute synonymes, the discovery of the character of an interior, or the more complete elucidation of the characters of an obscure genus, may at any time give it a standing to which it is not at present entitled. For this reason, it is certain that no classification of so large a group of fossil forms as the *Brachiopoda* comprise can be anything more than tentative for many years to come.

The dates are in all cases intended to represent those of actual publication, a matter not always easy to determine. In some difficult cases, where the date of presentation of a MSS. appears on the title-page without any reference to the actual date of publication, the former is used as a numerator, and the earliest date for publication to which the paper is known to be entitled as a denominator, of a fraction in the date column.

It will not be a matter of surprise that, in giving references for good figures, the magnificent works of Mr. Davidson have almost constantly been drawn upon. Students are to be congratulated that these are among the most accessible works on the subject.

Since *Calceola* has for so long a period been referred to as a Brachiopod, or included with them, it has been decided to include its very copious synonymy, though it is now known, through the researches of Dr. Lindström, to belong to the *Coelenterata*.

A bibliography was originally contemplated in connection with the index, but it was soon found that, to make it complete, more time and space would be required than could conveniently be devoted to it.

It is hoped that few important mistakes exist in the list, though the character of the references is such as to render the work particularly liable to typographical errors. Not a few such errors which appear in earlier works of the kind have been corrected, and the indulgence of the reader is requested for any new ones which may unfortunately have crept in.

References have usually been made in a sufficiently full manner to be readily identified; a few exceptions are, therefore, noted.

Dav. 1853; *to* A general Introduction to the Classification of the Brachiopoda, by Thos. Davidson, F. G. S. &c. *being* British Fossil Brachiopoda, vol. i, art. iii, Paleontographical Society, London, 1853, 4to.

The references to the subsequent series of Monographs are made by the geological horizon; as, "Mon. Silurian Brach. p." &c.

Dav. 1856; *to* Introduction à l'Histoire Naturelle des Brachiopodes Vivants et Fossiles, par Thos. Davidson, Esq. traduit de l'Anglais par MM. Deslongchamps: *in* Mémoires de la Société Linnéenne de Normandie, x, pp. 69–271, Caen, 1856, 4to.

Dalm. Ter.; *to* Uppställning och Beskrifning af de i Sverige funne Terebratuliter; af J. W. Dalman; *in* Kongl. Vet. Acad. Handlingar för är 1827, pp. 85–180; t. i-vi, Stockholm, 1828, 8vo.

Chenu, Man.; *to* Manuel de Conchyliologie et de Paléontologie Conchyliologique, par le Dr. J. C. Chenu, t. ii, Paris, 1862, gr. 8vo.

Woodw. Man.; *to* A Manual of the Mollusca, or, a Rudimentary Treatise of Recent and Fossil Shells, by S. P. Woodward, &c. London, 1851–56, 12mo.

Paetel, Fam. u. Gatt. Moll.; *to* Die bisher veröffentlichten Familien- und Gattungsnamen der Mollusken, zus. von Fr. Paetel, Berlin, 1875, 8vo.

A work containing more and worse typographical and other errors than any other book, of a scientific tendency, known to me.

Regent's Rep.; *to the* (—) Annual Report of the Regents of the University, on the condition of the State Cabinet of Natural History, and the Historical and Antiquarian Collection annexed thereto. Made to the senate (—). Albany (New York), &c. 8vo. (Blue books.)

Of the series, Nos. III, IV, and VII to XXVII all contain, in the form of appendices, matter relating to the geology, mineralogy, paleontology, botany, general natural history, ethnology, or philology of America, chiefly that division of each subject relating to the State of New York. In each of these departments, some of the papers are of permanent value and importance, which need not be specified in relation to the long series of paleontological notices by Prof. James Hall and others. The third report appeared in 1850, and they have continued, at rather irregular intervals, to be issued for each year up to that for the year 1875, which is believed to be partly printed, (January, 1877). The title in each begins with the serial number of the report and ends with the date of presentation to the State legislature. The date at the bottom of the title-page is usually that of the year of presentation; but in this and in the verbal construction of the title the reports are not uniform. In the earlier ones, there is very rarely any date referring to the actual time of publication, which latter might differ from that on the title-page by a year or more. The appendices in which the scientific papers are comprised, should it be required, are subject to revision up to the time of publication. The latter date, in the case of those cited, has been obtained from trustworthy contemporaneous authority in all cases, and is believed to be essentially correct; but a reference to American paleontological literature will show several instances of the difficulties with which this unfortunate want of exactitude in the matter of dates has beset the path of the contemporary student.

NOTE.—The table of geological distribution rests in part on a similar table published by Mr. Davidson in the Annales de la Soc. Malac. de Belgique, t. x, 1875, though numerous changes and additions have been introduced and a different form of presentation preferred.

Names contained in bare lists and catalogues without definition, it has not been attempted to enumerate, except when the publication was of the nature of a nomenclator.

Etymologies have, for the most part, been intentionally ignored.

INDEX.

Acrotreta, Kutorga. *Siphonotretæ.* **1848.**

Verh. K. Min. Ges. St. Petersb. für 1847, p. 260, 275, t. vii, f. 7 *a–c.* First sp. *A subconica,* Kut. l. c. (Sil.). Taken as type by Davidson, 1856, p. 241, pl. xiv, f. 19–23.

Actinoconchus, M'Coy. *Spiriferidæ.* **1844.**

Carb. Foss. of Ireland, p. 149. Sole ex. cited, p. 150, pl. 21, f. 6, *A. paradoxus,* M'Coy, l. c. Woodward, Man. p. 224, f. 134. (=*Athyris,* M'Coy; Davidson, 1856, not of 1853.)

Adhærentia, Reeve. *Brachiopoda.* **1841.**

Conch. Syst. i, p. 174. Tribe Brach. cont. *Orbicula, Crania, Thecidea.* (Not *Adhærentia,* De Haan, 1825.)

Ænigma, Koch. *Conchifera.* **1845.**

Mart. Chemn. Conchyl. Cab. b, Lief 56, Bd. vii. (Recent.) Type *Tellina ænigmatica,* Chemn. l. c. Genus acephal. male ref. Pfeiffer, Zeitschrift für Mal. 1846, p. 175; ad Brach.

Æquivalves, Latreille. *Lyopomata.* **1825.**

Fam. Nat. Règne An. Fam. Brach. cont. *Lingula.* (= *Æquivalvia,* Berth.)

Æquivalvia, Berth. *Lyopomata.* **1827.**

Latreille, Fam. Nat. Germ. Ed. p. 208. Fam. prima, ordine Pelunculato, cont. *Lingula.* (Cf. *Æquivalves.*)

Agulhasia, King. *Terebratulidæ.* **1871.**

Ann. Mag. Nat. Hist. ser. iv, t. vii, Feb. p. 109, pl. xi, f. 1–8. (Recent.) Type *A. Davidsonii,* King, l. c. p. 111. (=*Terebratulina,* D'Orb.)

Amblotrema, Rafinesque. (*Incertæ sedis.*) **1831.**

Mon. Biv. Shells Ohio, p. 8. No ex. cited; diagnosis insufficient.

Amblytrema, Agassiz. **1847.**

Nom. Zool. Index, p. 45. (=*Amblotrema,* Raf. corrig.)

Ambocoelia, Hall. *Spiriferidæ.* **1860.**

13th Regent's Rep. p. 71. Type *Orthis umbonata,* Conr. Journ. Acad. Nat. Sci. Phil. viii, p. 264, t. xiv, f. 4, 1842. Hall, l. c. f. 1–6. (=*Martinia,* M'Coy.)

Ambocoilia, Quenstedt. **1871.**

Petref. Deutschlands, ii, p. 714; lapsus. (=*Ambocoelia,* Hall.)

Amphiclina, Laube. *Strophomenidæ.* **1865.**

Fauna Schicht. St. Cassians, 2te Abth. p. 28, pl. xiii, f. 9 *a–d.* Type *Producta dubia,* Munster sp. (Beitr. iv, p. 68, t. vi, f. 24), l. c.

Amphigenia, Hall. *Pentameridæ.* **1867.**

Not. Pal. N. York, vol. iv, p. 163. (Mar.) Pal. N. York, iv, p. 374, 383, pl. 59. Type *Pentamerus elongatus,* Vanuxem, (Rep. 3d Distr. N. York, p. 132, 1842); Hall, l. c. (Devonian.)

Anastrophia, Hall. *Pentameridæ.* **1867.**

Not. Pal. N. York, vol. iv, p. 163. Extra copies, Mar. 1867, p. 19. Pal. N. York, vol. iv, p. 374. Type *Pentamerus Verneuili,* Hall, l. c. Name proposed for *Brachymerus,* Shaler (*q. v.*), preoccupied by Dej. in *Coleoptera,* 1834.

Ancistrocrania, Dall. *Craniidæ.* **1877.**
Proposed for *Cranopsis*, Dall; preoccupied by A. Adams in *Gasteropoda*, 1860.

Ancylobrachia, Gray. *Arthropomata.* **1848.**
Ann. Mag. Nat. Hist. ii, p. 435. Ord. Brach. cont. fam. *Terebratulidæ.*

Ancylobrachia, King. *Arthropomata.* **1850.**
Perm. Foss. p. 81. Ord. Brach. cont. fam. *Strigocephalidæ, Terebratulidæ, Rhynchoridæ, Magasidæ, Thecidæidæ, Argiopidæ.*

Ancylobranchia, Paetel. *Arthropomata.* **1875.**
Fam. u. Gatt. Moll. p. 12; lapsus (= *Ancylobrachia*, Gray.)

Ancylopoda, Gray. *Brachiopoda.* **1848.**
Subclass Brach. Ann. Mag. Nat. Hist. ii, p. 435, cont. ord. *Ancylobrachia, Cryptobrachia.*

Ancylopoda King. *Arthropomata.* **1850.**
Perm. Foss. p. 81. Subclass Brach. cont. *Ancylobrachia.*

Annelida, Morse. *Invertebrata.* **1870.**
Am. Journ. Sci. and Arts, vol. l, p. 100, July. Class cont. (among other things) *Brachiopoda.*

Anomia, Linné. *Mollusca.* **1758.**
Syst. Nat. ed. x, p. 701. First sp. *A. craniolaris*, Lin.
Syst. Nat. ed. xii, p. 1150, 1766. First sp. *A. craniolaris*, Lin.
Genus including *Brachiopoda* and *Acephala*, sp.

Anomites, Auctt. *Invertebrata.* **1766.**
Gen. biv. fos. *Anomiæ* Lin. resp. auctt. xviii^ma cent.

Anomites, Schlotheim. *Invertebrata.* **1822.**
Petref, p. 246. Gen. biv. fos. cont. *Craniolites, Hysterolites, Terebratulites.*

Anoplotheca, Sandberger. *Atrypidæ.* **1856.**
Sitzungsb. K. Akad. Wiss. Wien für 1855, pt. xvi, p. 5, xviii, p. 102-104. Pl. i, f. 1-6. Type *A. lamellosa*, Sandb. l. c. = *Ter. venusta*, Schnur; Meyer & Dunker, Paleont. iii, p. 180, pl. xxiv, f. 3. Davidson, 1856, p. 260, pl. xiv, f. 51-53.

Anteletes, D'Orbigny. *Arthropomata.* **1850.**
Pal. Franç. Terr. Cret. iv, p. 348, in syn. (= *Enteletes.*)

Antinomia, Catullo. *Terebratulidæ.* **1850.**
Quart. Journ. Geol. Soc. of London, vii, p. 74. Type *Terebratula diphya*, Col. sp., Davidson, 1856, pl. vi, f. 5. (= *Pygope*, Link.)

Antirhynchonella, Quenstedt. *?Rhynchonellidæ.* **1871.**
Petref. Deutschl. ii, p. 231, 727. ? Subg. *Pentamerus;* first sp. *P. tenuistriatus*, Walmstedt sp., Eichwald, Leth. Ross. i, p. 789; second sp. *P. linguifer*, Murch. Sil. 21, 22.

Apalosia, Rafinesque. *Invertebrata.* **1815.**
Analyse de la Nature, p. 136. Class equivalent to the *Mollusca* of Cuvier. (= *Mollusca.*)

Aplecerotis, Pætel. *(Incertæ sedis.)* **1875.**

Fam. u. Gatt. Moll. p. 14; lapsus (= *Apleurotis*, Raf.).

Apleurotis, Rafinesque. *(Incertæ sedis.)* **1819.**

Journ. de Phys. lxxxviii, p. 427. No species described. First of two names cited, *A. pectenoides*, Raf. l. c. Fos. Ohio. Ibid. En. Rem. Obj. Cab. Raf. 1831, p. 3, *A. pectinoides*, Raf. is described. (*Brachiopoda?*)

Aplosia, Agassiz. **1847.**

Nom. Zool. Index, p. 84; lapsus (= *Apalosia*, Raf.)

Apygia, Bronn. *Brachiopoda.* **1862.**

Klass. u. Ordn. Thierreichs, iii, 1ste Abth. p. 301. Ord. cont. *Brach. articulata.* (= *Arthropomata.*)

Arbusculites, Murray. **1831.**

Edinburgh New Phil. Journ. xi, p. 148. Type *A. argentea*, Murr. l. c.

A fictitious genus of Zoophytes founded, according to Bronn, on the tubular spines of a species of *Productus.*

Arbusculithes, Paetel. **1875.**

Fam. u. Gatt. Moll. p. 15. (= *Arbusculites* Murray.)

Argiope, Deslongchamps. *Terebratulidæ.* **1842.**

Mém. Soc. Lin. de Normandie, vii, p. 9. (Recent.) Type *Anomia decollata*, Chemnitz, Conchyl. Cab. viii, p. 96, pl. 78, f. 705. Dav. 1853, p. 72. Davidson, 1856, pl. vii, f. 35–38. Name preöccupied by Savigny and Audouin for a genus of *Arachnida*, 1827. (= *Megathyris*, D'Orb.)

Argiopidæ, King. *Arthropomata.* **1850.**

Perm. Foss. p. 81. Fam. Brach. cont. *Argiope.*

Argiopina, Gray. *Arthropomata.* **1853.**

Brit. Mus. Cat. Brach. p. 15. Tribe Brach. cont. *Argiope.*

Argyope, Deslongchamps. *Terebratulidæ.* **1842.**

Mém. Soc. Lin. de Normandie, vii, p. 9. Vernacular equivalent for *Argiope*, Desl. q v. (= *Megathyris*, D'Orb.)

Arthropomata, Owen. *Brachiopoda.* **1858.**

Encyclop. Britannica, ed. viii, t. xv, art. Mollusca, p. 336. Ord. cont. *Brach. articulata.*

Articulata, Huxley. *Brachiopoda.* **1864.**

Lect. on Classification. Intr. Class. An. p. 116. Order cont. Brachiopoda articulata. (= *Arthropomata*, Ow.)

Athyridæ, Phillips. *Brachiopoda.* **1841.**

Pal. Foss. Cornwall and Devon. p. 54. Fam. Brach. cont. *Producta, Calceola.*

Athyridoidæ, Agassiz. *Brachiopoda.* **1847.**

Nom. Zool. Index, p. 115. (= *Athyridæ*, Phill. corrig.)

Athyris, M'Coy. *Spiriferidæ.* **1844.**

Carb. Foss. Ireland, pp. 128, 146, f. 19. Erroneous diagn. No type specified. First sp. p. 147, is *Ter. concentrica*, von Buch, Chenu, Man. ii, p. 216, f. 1108–10. Davidson, 1856, pl. ix, f. 23, 29, 30. Etym. *a*, without; *thuris*, a door or deltidium (not doorway or foramen). Syn. *Seminula*, M'Coy, 1844; *Actinoconchus*, M'Coy, 1844; *Spirigera*, D'Orbigny, 1847; *Esthyris*, Quenst. 1871; *Athyris*, Davidson, 1856, not 1853.

Athyris, Davidson. *Spiriferidæ.* **1853.**

Intr. p. 72, pl. vi, f. 71, 72. Type *Atrypa tumida*, Dalman, sp. Ter. p. 134, t. v, f. 3, 1828. Davidson, 1856, pl. ix, f. 33, 37. (= *Meristella*, Hall, not *Athyris*, M'Coy.) Cf. *Meristella*, Hall, 1862.

Athyris, Davidson. *Spiriferidæ.* **1856.**

Intr. p. 166, pl. ix, f. 23, 29, 30. Type *A. concentrica*, von Buch, M'Coy. (= *Athyris*, M'Coy.)

Atremosia, Rafinesque. *Brachiopoda.* **1831.**

Mon. Biv. Shells Ohio, p. 8. Fam. Brach. cont. gen. *Orbicula*, *Strophesia*, *Diclipsites*, *Trunculites*, *Productus*, *Styriasis*, *Goniclis*, *Megarites*.

Atretia, Jeffreys. *Rhynchonellidæ.* **1876.**

Proc. Roy. Soc. London, 1870, 121, p. 421, ¶ 36. Type *A. gnomon*, Jeffr. MS. No description of genus or species. Ann. Mag. Nat. Hist. Sept. 1876, p. 250. Genus and species fully described. Dav. Suppl. Brit. fos. Brach. 1874, p. 7, pl. i, f. 7–10. Syn. *Cryptopora*, Jeffr. (= *Dimerella*, Zittel, *q. v.*)

Atrypa, Dalman. *Atrypidæ.* **1828.**

Kongl. Vet. Acad. Handl. 1827, p. 102. First sp. p. 127, t. iv, f. 2. *Anomites reticularis*, Wahlenberg, Act. Upsal. viii, p. 65. Davidson, 1856, pl. ix, f. 39–46. (Cf. *Spirigerina*, D'Orb.)

Atrypa, M'Coy. *Atrypidæ.* **1844.**

Carb. Foss. Ireland, p. 150, f. 30. First sp. *Terebratula acuminata*, Sowerby, Min. Conch. t. 324, 1823. Dav. 1856, t. x, f. 19.

Atrypidæ, Dall. *Arthropomata.* **1877.**

Fam. Brach. cont. *Atrypa*, *Anoplotheca*, *Zygospira*, *Cœlospira*, *Koninckina*, and probably *Davidsonia*.

Well distinguished from *Spiriferidæ* by the direction of the spires, which must have necessitated a wholly different arrangement of the internal organs. Indicated long since by D'Orbigny.

Aulacorhynchus, Dittmar. *Arthropomata.* **1871.**

Verh. K. Min. Ges. St. Petersburg, 2te ser. vii, p. 1, t. 1, f. 1–13. (Carb.) Type *A. Pachti*, Dittmar, l. c. pp. 2–4, &c.

A remarkable form of doubtful family relations, of which species have been referred to *Chonetes* and *Leptæna*.

Brachiopoda, Cuvier. *Invertebrata.* **1802.**

Annales du Mus. i, 1802, p. 77, fide Quenstedt.
Dict. Sci. Nat. i, p. 134, 1805.
Roissy, Moll. vi, p. 460, 1805. Class cont. *Arthropomata* and *Lyopomata* of Owen.

Adt. Dumeril, 1806, Traite Élém.	Order.
Lamarck, 1809, Phil. Zool. p. 317.	Fam.
Cuvier, 1817, Règne Anim. ii, 358, 502.	Class.
Lamarck, 1819, Hist. An. s. Vert.	Fam.
Ferussac, 1819, Tabl. Syst. xxxviii.	Class.
Schweigger, 1820, Naturges. p. 689.	Order.
Latreille, 1825, Fam. Nat. Règne An.	Class.
Rang, 1829, Man. p. 257.	Order.
Fleming, 1828, Brit. An. p. 225.	Divis.
Menke, 1828, Syn. p. 56.	Class
Deshayes, 1830, Enc. Méth. ii, p. 140.	Sub-class.
Eichwald, 1831, Zool. Spec.	Order.
Geinitz, 1846, Grundr. Verst. p. 489.	Order.
Gray, 1848, Ann. Nat. Hist. p. 433.	Class.
Davidson, 1851-54, Intr. Brach. p. 41.	Class.

Brachiopodæ, Bronn. **1824.**

Syst. Urwelt Conch. p. 35, as of Lamarck.

Brachiopodes, Bellerm. **1814.**

Mag. Berliner Ges. Naturf. Freunde, vii, p. 88 (not seen).

Brachiopodes cirrides, D'Orbigny. **1849.**

Cours Élém. Pal. p. 80. Ord. Brach. cont. *Thecidæ, Caprinidæ, Radiolidæ.*

Brachiopodidæ, Broderip. **1839.**

Penny Cyclop. xiv, art. Malacology, p. 320. (=*Brachiopoda*, Cuv.)

Brachipoda, Bronn. **1848.**

Index Paleont. passim; lapsus (=*Brachiopoda*, Cuv.).

Brachymerus, Shaler. *Pentameridæ.* **1865.**

Brach. Anticosti, Bull. Mus. Comp. Zool. i, p. 69. Type *Pentamerus Verneuili*, Hall, Pal. N. York, iii, pl. 48, f. 1, *a, o, p, t, x, v.* (Sil.) Nom. præoc. by Dej. Col. 1834. (=*Anastrophia*, Hall.)

Brachyopoda, Fic. u. Carus. **1826.**

Ueber Ges. Thierr. * * Oken, Isis, 1828, p. 855. (*Brachiopoda.*)

Brachyprion, Shaler. *Strophomenidæ.* **1865.**

Brach. Anticosti, Bull. Mus. Comp. Zool. i, p. 63 (June.). Type *Strophomena leda*, Billings, Lower Sil. Foss. p. 120, cut, 1862.

Brachythyris, M'Coy. *Spiriferidæ.* **1844.**

Carb. Foss. Ireland, p. 128, f. 20. First sp. p. 144. *Spirifera duplicicosta*, Phillips, Geol. Yorks. ii, 218, pl. x, f. 1, 1836. (=*Spirifer*, Sow.)

Branchiopoda, Risso. **1826.**

Hist. Nat. Europe Mér. iv, p. 386. Not of Latreille, fam. Crustaceorum. (=*Brachiopoda*, Cuv.)

Bucardites, Argenville. *Mollusca.* **1757.**

Conchyl. p. 530. Non-binomial. Gen. cont. *Tridacna* sp. et *Terebratula* sp. fos.

Bufocephalus, Linné. *Brachiopoda.* **1779.**

Vollst. Natursyst. Min. übersetz. von Gmel. iv, p. 49. Gen. Brach. costatæ, *Spiriferi* (sp.) teste Quenstedt, *Producti* (sp.) teste Scheuchzer.

Bursula, Klein. *Brachiopoda.* **1753.**

Ostracol. p. 173, pl. xii, f. 80. Gen. Brach. dubium. Blainville, Dict. Sci. Nat. v, Suppl. p. 139, ad *Terebratula*, Luid, ref. Sole ex. *B. corallina*, Klein, l. c. (non-binomial).

Calceola, Lamarck. *Coelenterata.* **1799.**

Prodrome, p. 89. Sole ex. *Anomia sandalina*, Gmel. Syst. Nat. iv, p. 349. Davidson, 1856, pl. xiii, f. 9-13. (Sil.) Not = *Calceola*, Swains. 1840.

This has been shown by Lindström to be a genus of operculated corals.

Calceolaceæ, Menke. *Invertebrata.* **1828.**

Syn. Mus. Menkeanum, p. 56. Fam. = *Les Acardes*, Desm.

Calceolacea, Menke. *Invertebrata.* **1830.**

Syn. Mus. Menkeanum, ed. ii[a], p. 95. Cf. præc.

Calceolæ, Desmoulins. *Coelenterata.* **1826.**

Bull. Soc. Lin. de Bordeaux, i, p. 241. Fam. cont. *Calceola.*

Calceolaria, Griffith. *Calceolidæ.* **1834.**

New Ed. Cuvier, An. Kingdom, xii, p. 92. (= *Calceola*, Lam.)

Calceolidæ, King. *Coelenterata.* **1846.**

Ann. Mag. Nat. Hist. xviii, p. 28. Fam. cont. *Calceola.*

Calceolina, Agassiz. *Coelenterata.* **1847.**

Nom. Zool. Index, p. 166. (= *Calceolidæ*, King, corrig. not = *Calceolina*, A. Adams, 1867.)

Calceolites, Schlotheim. *Calceolidæ.* **1820.**

Petrefactenkunde, p. 173. (*Calceola*, Lam.)

Camarella, Billings. *Rhynchonellidæ.* **1859.**

Canadian Nat. iv, Aug. p. 301. (Sil.) First sp. *C. Volborthi*, Bill. (l. c.), Rep. Progr. Canadian Geol. Surv. 1863, p. 143, f. 77 *a-c.* Second sp. *C. Panderi*, Bill. (l. c.), 1863, l. c., f. 76, *a, b*; not = *Triplesia*, Hall.

Typical species Rhynchonelloid; some of the others said to be Pentameroid.

Camarium, Hall. *Spiriferidæ.* **1859.**

12th Regent's Rep. Oct. p. 42-43, f. 1-6. *C. typum*, Hall, l. c. (Lower Held.) (= *Merista*, Suess.)

Camarophoria, Bronn. *Pentameridæ.* **1845.**

Leonh. u. Bronn, Jahrb. 1845, p. 254. (= *Camerophoria*, King cor.)

Camerella, "Billings", Paetel. *Rhynchonellidæ.* **1875.**
Fam. u. Gatt. Moll. p. 32; lapsus (= *Camarella*, Bill.).

Camerophoria, King. *Rhynchonellidæ.* **1846.**
Ann. Mag. Nat. Hist. xiv, 1844, p. 313. No description or ex. cited. Ibid. xviii, 1846, p. 89. Type *Terebratula Schlotheimi*, von Buch, cf. Chenu, Man. ii, p. 220, f. 1132. (Cf. *Stenocisma*, Conr.)

Capsularia, Llhwyd. *Brachiopoda.* **1699.**
Lith. Brit. Ichn. p. 466. Non-binomial. (Cf. *Delthyris*, Dalm.)

Centronella, Billings. *Terebratulidæ.* **1859.**
Canadian Nat. iv, April, p. 131, f. 1–5. (Dev.) *Rhynchonella glansfagea*, Hall. Cf. Hall, Am. Journ. Sci. Arts, xxxv, pp. 403, 405, f. 22; p. 400, f. 1–5, et Bill. l. c. xxxvi, p. 237, f. 8. Syn. *Cryptonella*, Hall, pars. (Cf. *Leptocœlia*, Hall, 1859.)

Charionella, Billings. *Spiriferidæ.* **1861.**
Can. Journ. Nat. Hist. May, 1861 (extras, Mar. 1861), p. 148. Sole ex. *Atrypa scitula*, Bill. (not Hall), p. 273, f. 100, 101. Ib. ex. *Ch. circe*, Bill. l. c. p. 273. (Dev.) Subg. *Athyris*. (Cf. *Meristella*, Hall, 1861.)

Chelodes, Davidson and King. (*Incertæ sedis.*) **1874.**
Quart. Journ. Geol. Soc. London (May), p. 167, pl. xviii, f. 14, *a–c*. Type *C. Bergmani*, D. & K. l. c. (Sil.) No gen. diagn.

Possibly a coral. Looks like the internal fulcrum of *Zirphæa* (*Leuconyx*, H. Adams!).

Chonetes, Fischer de Waldheim. *Productidæ.* **1837.**
Oryct. Gouvern. Moscou, part ii, p. 134, pl. 26, f. 8–9. Sole ex. *Orthis striatella*, Fisch. l. c. as of Dalman, = *Leptæna* seu *Producta variolata*, D'Orbigny, Voy. Am. Mérid. Pal. p. 49, pl. iv, f. 10, 11, 1842, = *Chonetes variolata*, Kon. Mon. *Chonetes*, p. 206, pl. xix, f. 5, xx, f. 2, *a–l*, 1847. (Sil.)

Chonetidæ, Bronn. *Arthropomata.* **1862.**
Klass. u. Ordn. Thierr.; Malacozoa, 3ten Bd., 1ste Abth. p. 301–2. Fam. Brach. cont. *Chonetes, Strophalosia, Orthothrix, Aulosteges.*

Chonetus, Paetel. *Productidæ.* **1875.**
Fam. u. Gatt. Moll. p. 42; lapsus (= *Chonetes*, Fisch.).

Choniopora, Schauroth. *Craniidæ.* **1854.**
Zeitschr. Deutsch. Geol. Ges. vi, p. 546. Type = *Crania Schaurothi*, Geinitz, Dyas, t. 20, f. 3, 1861. Quenstedt, Petref. Deutschl. 1871, p. 687, pl. 61, f. 90.

Genus described as a polyzoon, being covered with minute, short tubulæ, but may be a good section of *Crania*.

Choristides, Keferstein. *Brachiopoda.* **1829.**
Zeit. Geogn. p. 43; lapsus (= *Choristites*, Fischer).

Choristites, Fischer de Waldheim. *Spiriferidæ.* **1825.**
Sur la Choristite, p. 7, pl. 1, f. 1–4. First sp. *C. mosquensis*, Fisch. l. c. = *Spirifer m.*, Murch. Vern. u. Keys. Geol. Russ. ii, p. 161, pl. v, f. 2. Davidson, 1856, pl. viii, f. 26. Fisch. Oryct. Gouv. Moscou, 1830, t. 24, f. 1–4, *C. mosquensis* F. (= *Spirifer*, Sow.) Quenstedt. Petref. Deutschl. 1871, ii, pp. 27, 467, 506; atlas, pl. 53, f. 58–59, gen. Delthyridarum.

Cincta, Quenstedt. *Terebratulidæ.* **1871.**

Petref. Deutschl. ii, p. 27; atlas, t. 45, f. 93–121; gen. Epithyridarum. Type *Terebratula numismalis*, Lamarck, Hist. vi, p. 249, 1819. (= *Eudesia*, King.)

Cistella, Gray. *Terebratulidæ.* **1853.**

Brit. Mus. Cat. Brach. (Jan.) p. 114. Type *Terebratula cuneata*, Risso, Hist. Nat. Eur. Mérid. f. 179, 1826. Dall, Rev. Terebr. 1870, p. 146, f. 24. (Rec.) Syn. *Zellania*, Moore.

Cleidothyris, Paetel. *Brachiopoda.* **187[illegible].**

Fam. u. Gatt. Moll. p. 45; lapsus (= *Cleiothyris*, Phillips).

Cleiothyris, Phillips. *Atrypidæ.* **184[illegible].**

Pal. Foss. Cornwall and Devon, p. 55. Cf. Brit. Pal. Foss. Cambridge Mus. p. 196, 1852. Suggested to replace *Atrypa*, Dalman, on account of objections to the latter name, but not used in the text. (= *Atrypa*, Dalm.)

Cleiothyris, King. *Spiriferidæ.* **185[illegible].**

Ann. Mag. Nat. Hist. xviii, p. 32 (referred to *Atrypa*), 1846. Ibid. Perm. Foss. p. 138, pl. x, f. 1–10. Type *Terebratula pectinifera*, King, l. c. = *Atrypa pectinifera*, J. de C. Sow. Min. Conch. vii, p. 14, pl. 616, 1841. Not *Cleiothyris*, Phillips. (= *Athyris*, M'Coy.)

Cliothyris, Agassiz. *Atrypidæ.* **1847.**

Nom. Zool. Index, p. 259. (= *Cleiothyris*, Phil. corrig.)

Clipsilia, Rafinesque. (*Incertæ sedis.*) **182[illegible].**

Ann. Gen. Sci. Phys. Bruxelles, v, p. 232. Name only; no description or type cited. Gen. incert.

Clistenterata, King. *Brachiopoda.* **1873.**

Ann. Mag. Nat. Hist. ser. iv, vol. xii, p. 15, July. Subclass cont. Brach. articulata. (= *Arthropomata*, Owen.)

Clitambonites, Agassiz. *Brachiopoda.* **1847.**

Nom. Zoöl. Index, p. 259. (= *Klitambonites*, Pander corr.)

Coelospira, Hall. *Atrypidæ.* **1863.**

16th Regent's Rep. July, p. 60, cut. Type *Leptocoelia concava*, Hall. 10th Regent's Rep. 1857, p. 107. Hall's first species of *Leptocoelia*, but not congeneric with the species finally selected by Hall as typical of the latter. Cf. Am. Journ. Sci. and Arts, xxxvi, p. 16, f. 37, July, 1863. Same type. Not = *Leptocoelia*, Hall, 1859. (Comp. *Zygospira*, Hall.)

Comerophoria, Gray. *Pentameridæ.* **184[illegible].**

Ann. Mag. Nat. Hist. ii, p. 438; lapsus (= *Camerophoria*, King).

Concha anomia, Colonna. *Brachiopoda.* **161[illegible].**

Fab. Col. De Purpura, p. 23. Aquat. Obs. p. 43. Non-binomial. Indeterminate species of recent and fossil arthropomatous brachiopods.

Concha triangulata vulgaris, Gualteri. *Brachiopoda.* **1742.**

Index, tab. 82. Non-binomial. (= *Terebratula*, Llhwyd.)

Concha triloba, Klein. *Brachiopoda.* **1753.**

Ostracol. p. 172, t. xi, f. 75. Non-binomial. First species, *Striata prima, rarior, columnae;* Kl. l. c. p. 172. (*Incert.*)

Conchidium, Linné. *Pentameridæ.* **1760.**

Mus. Tessin. p. 90, t. v, f. 8, 1753. *C. biloculare,* Lin. l. c. Ibid. Syst. Nat. ed. xi, ii, p. 163, 1760; diagn. in extenso, sole ex. *Pat.? bilocularis,* Lin. = *Anomites bilocularis,* Wahl. Acta Upsala, 1821, viii, p. 67, = *Gypidia conchidium,* Dalm. Quenst. Petref. Deutschl. ii, p. 227, 1871; atlas, pl. 43, f. 36–9. Syn. *Gypidia,* Dalman, Hall.

Conchites, Linné. *Brachiopoda.* **1753.**

Mus. Tessin. p. 88, t. v, f. 1–8. Indeterminate fossil Brachiopoda.

Conchyliolithus, Martin. *Brachiopoda.* **1809.**

Petref. Derb.* teste Agassiz. (Cf. *Conchites.*)

Conradia, Hall, MS. *Trimerellidæ.*

Cf. Dav. & King. Quart. Journ. Geol. Soc. London, 1874, p. 159. Not *Conradia,* A. Ad. (= *Dinobolus,* Hall.)

Crania, Retzius. *Craniidæ.* **1781.**

Schrift. Berliner Ges. Naturf. Freunde, ii, p. 72. Type *Anomia craniolaris,* Lin. Syst. Nat. ed. xii, i, pt. 1, p. 1150, = *C. brattensburgensis,* Retz. l. c. Davidson, 1853, pl. ix, f. 229. Syn. *Orbicula,* Cuv.

Craniacea, Menke. *Brachiopoda.* **1830.**

Syn. Mus. Menkeanum, ed. ii, p. 96. Fam. Brach. cont. *Thecidia, Crania, Orbicula.* (= *Les Cranies,* Rang.) Ibid. Anton, Verzeichn. 1839, p. xii.

Craniaceæ, Menke. *Brachiopoda.* **1828.**

Syn. ed. i, p. 56. (olim). (=*Craniacea,* Mke.)

Craniadæ, Forbes. *Lyopomata.* **1838.**

Mal. Monensis, p. 38. Fam. Brach. cont. *Crania, Discina?.*

Craniadæ, King. *Lyopomata.* **1850.**

Perm. Foss. p. 81. Fam. Brach. cont. *Crania, Siphonotreta, Criopus.*

Craniadæ, Gray. *Lyopomata.* **1840.**

Synops. Brit. Mus. i, p. 155. Fam. Brach. cont. *Crania.* Id. Ann. N. Hist. ii, p. 438, 1848. (= *Craniidæ.*)

Craniæ, Deshayes. *Invertebrata.* **1830.**

Encycl. Méth. iii, p. 533, table. Fam. Brach. cont. *Calceola, Crania.*

Craniadées, Davidson. *Lyopomata.* **1856.**

Intr. Ed. Deslongchamps, p. 226. Fam. Brach. cont. *Crania.*

Cranicella, Rafinesque. (*Incertæ sedis.*) **1815.**

Analyse de la Nature, p. 148. Name only; no type cited or diagnosis given. (? = *Crania,* Retz.)

Cranidæ, D'Orbigny. *Lyopomata.* **1849.**

Cours Élém. Pal. p. 90. Fam. Brach. cont. *Crania.*

Cranidées, D'Orbigny. *Lyopomata.* **1847.**

Comptes Rendus, xxv, p. 269. Fam. Brach. cont. *Crania.*

Craniidæ, King. *Lyopomata.* **1846.**

Ann. Mag. Nat. Hist. xviii, p. 28. Fam. Brach. cont. *Crania, Siphonotreta.*

Craniidæ, H. and A. Adams. *Lyopomata.* **1858.**

Gen. Rec. Moll. ii, p. 583. Fam. Brach. cont. *Crania.*

Craniolites, Schlotheim. *Lyopomata.* **1820.**

Petrefactenkunde, p. 247. A general term for the fossil sp. of *Crania.*

Craniolithes, Auctt. *Lyopomata.*

Cf. *Craniolites.*

Craniops, Hall. *Craniidæ.* **1859.**

12th Regent's Rep. p. 84 in catalogue. No diagnosis; inserted as a corrected name for *Orbicula* (?) *squamiformis*, Hall, Geol. Rep. 1843, p. 108, f. 1; Pal. N. Y. ii, p. 250, t. 53, f. 4 *a–b.* (Sil.) Hall, Pal. N. Y. iv, p. 413, 1867 (advance copies only; omitted in the published volume). Davidson, Annales Soc. Mal. Belgique, x, 1874, table, No. 107. (= *Pholidops*, Hall.) Not *Cranopsis*, Dall. Comp. *Pseudocrania*, McCoy.

Pholidops was substituted for this name with the same type and a full description in the 13th Rep. p. 92.

Craniscus, Dall. *Craniidæ.* **1871.**

Bull. Mus. Comp. Zool. iii, No. i, p. 27. Type *Crania tripartita*, Munster sp. Davidson, 1856, pl. xiii, f. 21.

Cranopsis, Dall. *Craniidæ.* **1871.**

Bull. Mus. Comp. Zool. iii, pt. 1, p. 26–7. Type *Crania parisiensis*, Defrance sp. Davidson, 1856, pl. xiii, f. 23 *a–b.* (= *Ancistrocrania*, Dall.) Not *Cranopsis*, A. Ad. 1867, gen. gast.

Crepidites, Schroter. *Calceolidæ.* **1780.**

Lith. Lex. i, p. 366. Non-binomial. (= *Crepites*, Hupsch.)

Crepidolite, Rozier. *Calceolidæ.* **1774.**

Journ. de Phys. iii, p. 150. Non-binomial. Cf. *Calceola.*

Crepidolithus, Hupsch. *Calceolidæ.* **1768.**

Neue Entdeck. pp. 40, 56. Non-binomial. Cf. *Calceola.*

Crepite, Rozier. *Calceolidæ.* **1774.**

Journ. de Phys. iii, p. 150. Non-binomial. Cf. *Calceola.*

Crepites, Hupsch. *Calceolidæ.* **1768.**

Neue Entdeck. pp. 40, 56. Non-binomial. Cf. *Calceola.*

Criopiderma, Poli. *Craniidæ.* **1795.**

Test. utriusq. Sicil. ii, passim; lapsus (= *Criopoderma*, Poli).

Criopoderma, Poli. *Craniidæ.* **1795.**

Test. utriusq. Sicil. ii, pp. 189, 255, 261. Non-binomial. Sole ex. *C. turbinatum*, Poli, l. c. Cf. *Criopus*, Poli. (= *Crania*, Retz.)

Criopodes, Herrmannsen. **1852.**

Ind. Gen. Mal. Suppl. p. 38, pro *Kriopen*, Oken, *q. v.*

Criopododerma, Agassiz. *Craniidæ.* **1846.**

Nom. Zool. Fasc. ix, p. 301, index. (= *Criopoderma*, Poli corrig.)

Criopus, Gray. *Craniidæ.* **1821.**

London Med. Repository, p. 238. Fleming, Phil. Zool. ii, p. 499, 1822. Type *Patella anomala*, Mull. Gray in Leach, Moll. Gt. Brit. 1852, p. 358, pl. xiii, f. 6. Sole ex. *C. orcadensis*, Leach, MS. = *Crania anomala*, Mull. sp. (= *Crania*, Retz.)

Criopus, Poli. *Brachiopoda.* **1791.**

Test. utriusq. Sicil. i, p. 34. Non-binomial. Ex. *C. fimbriatus*, Poli, l. c. = animal of various brachiopods.

Cryopus, Deshayes. *Brachiopoda.* **1836.**

An. s. Vert. ed. ii, vol. vii, p. 314, passim. (= *Criopus*, Poli.)

Cryptacanthia, White and St. John. *Terebratulidæ.* **1868.**

Trans. Chicago Acad. Sci. i, p. 119, *f.* 3, *a–c.* Type *Waldheimia compacta*, W. & St. J. l. c. (Dev.) (? = *Eudesia*, King.)

Cryptobrachia, Gray. *Brachiopoda.* **1848.**

Ann. Mag. Nat. Hist. ii, p. 435. Ord. Brach. cont. fam. *Thecidæadæ.*

Cryptobranchia, Paetel. *Brachiopoda.* **1875.**

Fam. u. Gatt. Moll. p. 58; lapsus (= *Cryptobrachia*, Gray).

Cryptocella, Paetel. *Brachiopoda.* **1875.**

Fam. u. Gatt. Moll. p. 59, as of Hall; ? lapsus (= *Cryptonella*, Hall). Not *Cryptocella*, H. & A. Ad. 1854.

Cryptonella, Hall. *Terebratulidæ.* **1861.**

14th Regent's Rep. p. 101–2. No type selected. First species mentioned p. 101, *Terebratula Lincklæni*, Hall. 13th Reg. Rep., p. 88. 15th Reg. Rep. p. 160, pl. iii, f. 6, 7; figures *C. eximia*, Hall, n. s. (Extra copies, descr. &c. p. 132–3.)

Cryptonella, Hall. *Terebratulidæ.* **1863.**

16th Regent's Rep. pp. 41, 43–47. *C. Juliæ*, Winchell, cited as example. *C. Lincklæni*, Hall, remanded to *Terebratula*, and the genus acknowledged to be a synonym of *Centronella*, Billings. (See note, p. 47, l. c.)

Cryptonella, Hall. *Terebratulidæ.* **1867.**

Notice of Pal. N. York, vol. iv, Mar. 1867, p. 20. *C. rectirostra*, Hall, the second species of the 14th Reg. Rep. taken as type. As last constituted, the group seems a valid section of *Waldheimia*. (Dev.)

Cryptonema, (Hall?) Bigsby. *Arthropomata.* **1868.**

Bigsby, Thes. Sil. p. 93; name only in list. Sole ex. cited *C. siluriana*, Hall (? lapsus, = *Cryptonella*).

Cryptopora, Jeffreys. *Rhynchonellidæ.* **1869.**

Nature, p. 136, Dec. 2, 1869. Ex. *C. gnomon*, Jeffr. No description of type or genus (*cf. Atretia*, Jeffr.).

Ctenites, Kentman. *Invertebrata.* **1565.**

Nom. rer. foss. p. 33; and other non-binomial writers.

Name for longitudinally striate bivalves, among which some brachiopods were counted.

Cunolites, Auctt.

Cf. Defrance, Dict. Sci. Nat. xxii, 1821, p. 402, in synonymy. (Cf. *Hysterolithus.*)

Curvulites, Rafinesque. (*Incertæ sedis.*) **1831.**

En. Rem. Obj. Cab. Raf. p. 4. Sole ex. *C. striata*, Raf. Not identifiable. Genus ref. by Agassiz, Nom. Zool. fasc. ix, p. 26, 1846, to the Brachiopoda.

Cyclothyridæ, Phillips. *Arthropomata.* **1841.**

Pal. Foss. Cornwall and Devon. p. 55. Fam. Brach. cont. *Epithyris, Hypothyris.*

Cyclothyrides, Agassiz. *Arthropomata.* **1847.**

Nom. Zool. Index, p. 519, = *Cyclothyridæ*, Phil. corrig.

Cyclothyris, M'Coy. (*Incertæ sedis.*) **1844.**

Carb. Foss. Ireland, p. 150, f. 29. No ex. cited; a generic figure given. Undeterminable.

Cyclothyris, Davidson. *Rhynchonellidæ.* **1856.**

Intr. p. 181, as of M'Coy; in synonymy. Type cited, *Rhynchonella latissima*, Sow. Min. Conch. ii, p. 37, t. 18, f. 1. (? = *Rhynchonella.*)

Cyrtæna, Hall. *Spiriferidæ.* **1867.**

Pal. N. Y. iv, p. 188, err. typ. ? = *Cyrtina*, Davidson.

Cyrthia, D'Orbigny. *Spiriferidæ.* **1847.**

Comptes Rendus, xxv, p. 268, male pro *Cyrtia*, Dalm.

Cyrtia, Dalman. *Spiriferidæ.* **1828.**

Kongl. Vet. Acad. Handl. f. 1827, pp. 93, 97. First sp. *C. exporrecta*, Dalm. l. c. p. 118, t. 3, f. 1, = *Anomites exporrectus*, Wahl. Act. Upsal. viii, p. 64. (Sil.) Second sp. (var. of last, teste Dav.) *C. trapezoidalis*, Dalm. l. c. p. 119, t. 3, f. 2. Davidson, 1856, pl. viii, f. 33. The first name is assigned to the type by Dav. 1856.

Cyrtina, Davidson. *Spiriferidæ.* **1858.**

Brit. Carb. Brach. p. 66. First sp. *Cyrtia heteroclita*, Defrance, Dav. l. c. p. 67, cut. Chenu, Man. ii, p. 215, f. 1101, 1103. Dav. 1856, pl. viii, f. 36–39. Ibid. Dev. Brach. p. 48, pl. ix, f. 1–16.

Daphnoidia, Hibbert. *Articulata.* **1836.**

Trans. Roy. Soc. Edinb. xiii, p. 180. No specific name applied; a genus of Entomostraca wrongly referred to the Brachiopoda by Agassiz, Nom. Zool. fasc. ix, p. 29, 1846.

Davidsonia, Bouchard-Chanteroux. *Atrypidæ.* **1849.**

Ann. Sci. Nat. c. xii, p. 84. Type *D. verneuili*, B.-C. l. c. Davidson, 1856, p. 207, pl. xiii, f. 2, 3, 6, 7.

Davidsonidæ, King. *Arthropomata.* **1850.**

Perm. Foss. p. 81. Fam. Brach. cont. *Davidsonia.* Davidson, 1853, p. 51. (Mel. *Davidsoniidæ.*)

Delthiridæa, Gray. *Terebratulidæ.* **1848.**

Ann. Mag. Nat. Hist. ii. p. 438; lapsus (= *Delthyridea*, M'Coy).

Delthyridæ, Phillips. *Arthropomata.* **1841.**

Pal. Foss. Cornwall and Devon. p. 54. Fam. Brach. cont. *Orthis, Spirifer, Strigocephalus, Pentamerus, Cleiothyris.*

Delthyridæ, Quenstedt. *Arthropomata.* **1871.**

Petref. Deutschl. ii, p. 27. *Mesopygia*, sect. ii, cont. subsect. a and b.

a.	b.
Spirifer.	*Spiriferina.*
Choristites.	*Syringothyris.*
Cyrtia.	*Cyrtina.*
Trigonotreta.	*Suessia.*

Delthyridacea, F. Braun. *Arthropomata.* **1840.**

Verz. Bayr. Petref. p. 44. Fam. Brach. cont. *Spirifer, Orthis.*

Delthyridea, M'Coy. *Arthropomata.* **1844.**

Carb. Foss. Ireland, p. 130, f. 27. No ex. cited, but an unrecognizable generic figure given. (*Genus incert.*)

Delthyridea, King. *Terebratulidæ.* **1850.**

Perm. Foss. p. 141. Type *Terebratula pectiniformis*, Schlotheim, Quenst. Handb. Petref. p. 463, t. 37, f. 14. (= *Trigonosemus*, Kön.)

Delthyris, Dalman. *Spiriferidæ.* **1828.**

Kongl. Vet. Acad. Handl. f. 1827, pp. 93, 99. First sp. l. c. p. 120, t. iii, f. 3, *D. elevata*, Dalm. a Silurian sp. of *Spirifer*, testo. Dav. Not *Delthyris* Mke. or von Buch. (= *Spirifer*, Sow.)

Delthyris, Menke. *Terebratulidæ.* **1830.**

Syn. Mus. Menkeanum, ed. ii. p. 96, as of Dalman, but types not congeneric. 1st spec. *Terebratella dorsata*, Lam. sp. Rve. Conch. Icon. v, f. 21 *a-d.* Not *Delthyris*, Dalm. (= *Terebratella*, D'Orb.)

Delthyris, von Buch. *Arthropomata.* **1837.**

Ueber Delthyris, p. 4. Genus a medley of forms belonging to various groups. Not *Delthyris*, Dalm.

Deltyrydæa, Davidson. *Terebratulidæ.* **1856.**

Intr. in synonymy of *Trigonosemus*, p. 126; lapsus (= *Delthyridea*, M'Coy).

Dicellomus, Hall. *Lyopomata.* **1871.**

23d Regent's Rep. p. 246, pl. 13, f. 6-9, 1873. (Extras Mar. 1871, fide Hall.) Types *D. crassa*, Hall, l. c. = *Obolella* sp. Bill. and *Obolella? polita*, Hall, 16th Reg. Rep. p. 133, pl. vi, f. 17-21. Jan. 1864. (Cf. *Schmidtia*, Volb. 1869.)

Diclipsites, Rafinesque. (*Incertæ sedis.*) **1831.**

Mon. Biv. Shells Ohio, p. 8. No ex. cited. *Gen. incert.*

Diclisma, Rafinesque. *(Incertæ sedis.)* 18

Ann. Sci. Phys. Bruxelles, 1820, p. 232; name cited without any description in Mon. Turbinolies de Kentucky. Id. Mon. Biv. Shells Ohio, 1831, p. 7. No ex. cited. *Genus incert.*

Dicoelosia, King. *Strophomenidæ.* 18

Mon. Perm. Foss. p. 106. (Sil.) Type *Anomia biloba*, Lin. Dav. 1853, t. viii, f. 143–5, sect. *Orthis.* (= *Bilobites*, Linné.)

Diconcha inæqualis, Klein. *Invertebrata.* 17

Ostracol. p. 171. Non-binomial. Section containing genera, *Terebratula, Concha triloba, Concha adunca, Bursula, Globus, Stola, Concha ansata.*

Dicraniscus, Meek. *Rhynchonellidæ.* 18

Am. Journ. Sci. and Arts., 3d ser. iv, p. 28. Type *D. ortoni*, Meek, l. c. Pal. Ohio, 1873, i, p. 176, pl. xv, f. 1 *a–k.* (= *Triplesia*, Hall.)

Dictyonella, Hall, MS. *? Rhynchonellidæ.*

20th Regent's Report, p. 274, Mar. 1867. (Sil.) Type *Atrypa corallifera*, Hall, Pal. N. York, 1852, p. 281. (= *Eichwaldia*, Bill.)

Dielasma, King. *Terebratulidæ.* 18

Proc. Dublin Un. Bot. Zool. Assoc. i, p. 260. Type *Terebratula elongata*, Schlotheim. Dav. Perm. Brach. p. 7, f. 5, 17, 18, 20. (= *Epithyris*, King, not Phillips. Cf. *Seminula*, M'Coy, 1855, not 1844.)

Dignomia, Hall. *Lingulidæ.* 18

23d Regent's Rep., p. 245, pl. 13, f. 3, 1873. Extras Mar. 1871, fide Hall. Type *D. alveata*, Hall, l. c.

Dimerella, Zittel. *Rhynchonellidæ.* 18

Dunker & von Meyer, Paleont. p. 220. Type *D. Gumbelli*, Zittel, l. c. p. 222, pl. xli, f. 27–30. Syn. *Atretia*, Jeffr. *Cryptopora*, Jeffr.

Dinobolus, Hall. *Trimerellidæ.* 18

23d Regent's Rep. p. 247, 1873. Extras, Mar. 1871, fide Hall. Type *Obolus Conradi*, Hall, 20th Reg. Rep. p. 368. (Compare *Acritis*, Volborth, 1869.) Adt. Dav. & King, Quart. Journ. Geol. Soc. London, May, 1874, p. 159, pl. xviii, f. 1–4. (Cf. *Obolellina*, Bill.)

Diphyites, Schroter. *(Incertæ sedis.)* 17

Lith. Lex. ii, p. 423. Non-binomial. († = *Pygope*, Link.)

Diplothyridæ, Quenstedt. *Arthropomata.* 18

Petref. Deutschl. ii, p. 27. Subsect. *Productidæ* cont. *Orthis, Orthisina, Leptæna, Strophomena, Streptorhynchus, Hysterolithus, Dicoelosia, Leptocoelia.* (*Diplothyra*, Tryon, = gen. *Pholadacea.*)

Discina, Lamarck. *Discinidæ.* 18

Hist. An. s. Vert. vi, p. 236. Type *D. ostreoides*, Lam. (not described), = *Orbicula norvegica*, Sow. non. Lam. = *Crania striata*, Schum. + *C. radiata*, Gould, Moll. U. S. Expl. Exped. p. 465, f. 480, *a–c*, 1852. (Recent.)

Discina, Dall. *Discinidæ.* 18

Bull. Mus. Comp. Zool. iii, p. 39, 1871. Subg. *Discina*, type *D. striata*, Schum. sp. (= *Discina*, Lam. sens. str.)

Discina, Turton. *Craniidæ.* **1822.**

Dithyra Brit. p. 238, ex parte. (= *Crania* sp.)

Discinella, Hall. (*Incertæ sedis.*) **1871.**

23d Regent's Rep. p. 246, 1873. Extras Mar. 1871, fide Hall. Diagnosis only; no ex. cited. *Gen. incert.* Said to = operculum of *Hyolithes* (*Pteropoda*).

Discinidæ, Gray. *Lyopomata.* **1840.**

Synops. Brit. Mus. i, p. 155. Ann. Mag. Nat. Hist. ii, p. 439. Fam. Brach. cont. *Discina.*

Discinidæ, King. *Lyopomata.* **1850.**

Perm. Foss. p. 81. Fam. Brach. cont. *Discina, Orbiculoidea, Trematis.*

Discinidæ, Davidson. *Lyopomata.* **1853.**

Intr. p. 51. Fam. Brach. cont. *Discina* (? *Orbiculoidea, Trematis*), *Siphonotreta* (? *Acrotreta*). Ibid. 1856, p. 90.

Discinina, Agassiz. *Lyopomata.* **1847.**

Nom. Zool. Index, p. 366. (= *Discinidæ*, Gray corrig.)

Discinisca, Dall. *Discinidæ.* **1871.**

Bull. Mus. Comp. Zool. iii, p. 37, May, 1871. Type *Discina lamellosa*, Broderip, Reeve, Conch, Icon. pl. i, f. 4, 1862. (= *Discina*, auct. not Lam.)

Eatonia, Hall. *Rhynchonellidæ.* **1857.**

10th Regent's Rep. p. 90, f. 1-7. No diagnosis. First sp. *Atrypa medialis*, Vanuxem, Pal. N. York, iii, t. 37, f. 1. (L. Held.) Ibid. 12th Regent's Rep. Oct. 1859, p. 35, f. 1-7, 1st. sp. *E. peculiaris*, Conr. 1841. Not *Eaionia*, Edgar Smith, gen. Gasterop. 1875.

Eichwaldia, Billings. (?) *Rhynchonellidæ.* **1858.**

Rep. Prog. Canadian Geol. Surv. p. 190. (L. Sil.) Type, p. 192, f. 24 *a-e*, l. c. *E. subtrigonalis*, Bill. Hall, 20th. Reg. Rep. p. 274. (Relations doubtful.) Syn. *Dictyonella*, Hall.

Eionia, Meek & Hayden. *Rhynchonellidæ.* **1864.**

Pal. Upper Missouri (Jurassic), p. 70, September; lapsus, pro *Eatonia*. (= *Eatonia*, Hall.)

Enteletes, Fischer de Waldheim. *Arthropomata.* **1830.**

Oryct. Gouv. Moscou, 1830, p. 193, t. 26, f. 6-7. Ex. *E. glabra*, Fisch. l. c. Ibid. Bull. Soc. Imp Nat. Moscou, 1843, p. 16. Ex. *E. Phillipsi*, Fisch. (*Gen. incert.*, probably = *Spirifer*, Sby.)

Enteliites, G. B. Sowerby. *Arthropomata.* **1842.**

Conch. Man. ed. ii, p. 144; lapsus (= *Enteletes*, Fisch.). Said by Sowerby to be a heterogeneous assembly.

Entogyræ, Dalman. *Arthropomata.* **1828.**

Kongl. Vet. Acad. Handl. f. 1827, p. 89. Sect. Brach. cont. *Delthyris, Cyrtia, Atrypa.*

Epithyridæ, Morris. *Arthropomata.* **1846.**

Quart. Journ. Geol. Soc. Lond. ii, p. 387. Division of *Terebratula* cont. sections characterized by sculpture.

Epithyridæ, Quenstedt. *Arthropomata.* **1871.**

Petref. Deutschl. ii, p. 27. Subsect. *Terebratulidæ*, cont. *Terebratula, Terebratulina, Terebratella, Nucleata, Trigonella, Cincta, Spirigera, Musculus.*

Epithyris, Phillips. *Arthropomata.* **1841.**

Pal. Foss. Cornwall & Devon. p. 55. No ex. cited. Diagn. insufficient. Genus and family indeterminable.

Epithyris, King. *Terebratulidæ.* **1830.**

Perm. Foss. p. 146. pl. vi, f. 30, 45. Type *Terebratulites elongatus*, Schlotheim sp. (King, l. c.), Acad. München, vi, p. 27, pl. vii, f. 7–9, 1816. Not *Epithyris* Phillips. Syn. *Dielasma*, King.

Epithyrus, Paetel. *Arthropomata.* **1875.**

Fam. u. Gatt. Moll. p. 77 ; lapsus (= *Epithyris*, Phillips).

Eudesia, King. *Terebratulidæ.* **1850.**

Perm. Fos, pp. 144, 246. Type *Terebratula orbicularis*, Sow. = *T. cardium*, Val. Lam. Hist. An. s. Vert. vol. vi, p. 255, 1819. (Oölitic). Dav. Mon. Oölitic Brach. p. 43, pl. xii, f. 13–18. Ann. Mag. Nat. Hist. 1850, pl. xiv, f. 47. Quenstedt, Petr. Deutschl. 1871, pl. 45, f. 67–71.

This genus, being identical with *Waldheimia*, was withdrawn by Prof. King in favor of the latter name, which was simultaneously published (see Perm. Foss. p. 246). Since *Waldheimia* is preoccupied in *Hymenoptera*, this name may advantageously be revived for the genus.

Eumetria, Hall. *Spiriferidæ.* **1864.**

16th Regent's Rep. pp. 54–5, 59, f. 2–3. Types *Retzia vera*, Hall, l. c. and *R. serpentina*, Koninck, Chenu, Man. ii, p. 216, f. 1111. (= *Acambona*, White. Cf. *Retzia*.)

Euthyris, Quenstedt. *Spiriferidæ.* **1871.**

Petref. Deutschl. ii, p. 444. Name proposed to replace *Athyris*, which Q. regards as inappropriate. But *Seminula, Actinoconchus*, and *Spirigera* have prior claims if *Athyris* be rejected. (= *Athyris*, McCoy.)

Fissirostra, D'Orbigny. *Terebratulidæ.* **1847.**

Comptes Rendus, xxv, p. 269. Cours Élém. Pal. p. 89. (Cf. *Fissurirostra*, D'Orb.)

Fissirostris, Gray. *Terebratulidæ.* **1848.**

Ann. Mag. Nat. Hist. ii, p. 436; lapsus (= *Fissirostra*).

Fissurirostra, D'Orbigny. *Terebratulidæ.* **1848.**

Pal. Franç. Ter. Cret. iv, p. 32, t. 520. Type *F. recurva*, Defrance sp. (D'Orb. l. c.). Davidson, 1856, p. 126, t. vii, f. 6–8. D'Orb. 1850, Ann. Sci. Nat. c. xiii, pp. 341, 346, (= *F. elegans* var.). (= *Trigonosemus*, König.)

Fissuristra, Paetel. *Terebratulidæ.* **1875.**

Fam. u. Gatt. Moll. p. 82, as of D'Orb. ; lapsus (= *Fissirostra*, D'Orb.).

Fixivalves, Latreille. *Invertebrata.* **1825.**

Fam. Nat. Règne An.* Fam. Brach. = *Fixivalvia*, Berth.

Fixivalvia, Berth. *Invertebrata.* **1827.**

Germ. ed. Latreille, Fam. Nat. p. 196. Fam. Brach. cont. *Orbicula, Crania, Acardo?, Sphærulites?.*

Fremula, Dall. *Terebratulidæ.* **1871.**

Am. Naturalist, March, 1871, p. 55 (diagn. err.). Type *F.* (*Megerlia*) *Jeffreysi*, Dall, Am. Journ. Conch. vii, p. 65, pl. xi, f. 7–10. (Recent.) (= *Megerlia*, King, subg. *Ismenia*, Dall, not King.)

Fusella, M'Coy. *Spiriferidæ.* **1844.**

Carb. Foss. Ireland, pp. 128, 132. Type *Spirifera fusiformis*, Phillips, Geol. Yorkshire, p. 217, pl. ix, f. 10–11, as of J. de C. Sowerby MS. 1836. (= *Spirifer*, Sow.)

Glossina, Phillips. *Lingulidæ.* **1848.**

Mem. Geol. Survey Great Britain, ii, part ii, p. 370. (No diagn.) Cites *Lingula attenuata*, Sow. Dav. Mon. Sil. Brach. p. 44, t. iii, f. 18–27, and *Lingula crumena*, Phil. l. c. p. 369, pl. xxiv, f. 1–6. Dav. Mon. Sil. Brach. p. 40, t. ii, f. 1–6. (Sil.) Section containing the trigonal paleozoic *Lingulæ*, and which will probably eventually be adopted.

Glottidia, Dall. *Lingulidæ.* **1870.**

Am. Journ. Conch. vi, p. 157, pl. viii, f. 1–6. (Recent.) Type *Lingula albida*, Hinds, Voy. Sulph. p. 71, pl. xix, f. 4.

Gonambonites, Pander. *Strophomenidæ.* **1830.**

Beitr. Geogn. Russ. Reiches, p. 77, t. iii, f. 1, xxviii, f. 15, generic diagrams. First sp. p. 77, t. xxv, f. 1, *G. lata*, Pander, l. c. (Sil.), which, according to Bronn, Ind. Pal. ii, p. 539, with *G. plana* and other of Pander's sp. is the same as "*Orthis*" *plana*, Murch. Verneuil & Keys. Geol. Russia, ii, p. 199, t. xi, f. 7, = "*Orthis*" *plana*, Quenstedt, Petr. Deutsch. 1871, p. 545, t. 55, f. 37–41, which is a *Klitambonites*. Syn. *Orthisina*, King. (= *Klitambonites*.)

Goniclis, Rafinesque. (*Incertæ sedis.*) **1831.**

Mon. Biv. Shells Ohio, p. 8. No ex. cited; diagn. insuff.

Goniocoelia, Hall. *Spiriferidæ.* **1861.**

14th Regent's Rep. p. 101, and 15th do. pl. ii, f. 17–25. Subg. *Meristella.* (Upper Held.) Type *Atrypa uniangulata*, (Conr.) Hall, var. *uniplicata*, = *Atrypa unisulcata*, Conr., Hall, Pal. N. York, iv, p. 309. (= *Pentagonia*, Cozzens.)

Gonotrema, Rafinesque. (*Incertæ sedis.*) **1820.**

Ann. Sci. Phys. Bruxelles, v, p. 232, in Mon. Turbinolies de Kentucky. Short descr. No ex. cited. Ibid. Mon. Biv. Shells Ohio, p. 7. No ex. cited.

Gotlandia, Dall. *Trimerellidæ.* **1870.**

Am. Journ. Conch. vi, p. 160. Type *G. Lindstromi*, Dall, l. c. p. 161, = *Trimerella*, sp. Lindström, Ofv. K. Vet. Akad. Forh. f. 1867, p. 253, pl. 21. (Sil.) Provisional genus proposed on Lindström's figures, which, proving to be inaccurate, the genus was withdrawn by Dall, l. c. vii, p. 81, 1871. (= *Trimerella*, Bill.)

Griphus, Blainville. *Terebratulidæ.* **1828.**

Dict. Sci. Nat. liii, p. 145, div. Terebr. = *Gryphus*, Meg.

Gryphites, Llhwyd. *Invertebrata.* **1699.**

Lith. Brit. Ichn. p. 26, and other non-binomial authors. Cont. *Gryphæa*, sp. et *Productus*, sp. foss.

Gryphus, Megerle von Muhlfeld. *Terebratulidæ.* **1811.**

Schrift. Berl. Ges. Naturf. Freunde, 1811, p. 64. Ex. *Terebratula vitrea*, Lam. Davidson, 1853, pl. vi, f. 1–2. Not *Gryphus*, Brisson or Wagler. (= *Terebratula*, Muller.)

Gryphytes, Da Costa. *Invertebrata.* **1776.**

Elem. Conch. p. 250. Non-binomial. Cf. *Gryphites.*

Gwynia, King. *Terebratulidæ.* **1859.**

Proc. Dublin Univ. Zool.-Bot. Assoc. i, p. 258, f. 1–5. Type *G. capsula*, King, l. c. Reeve, Conch. Icon. x, f. 39. An immature form, perhaps *Waldheimia cranium* test. juv.

Gypidia, Dalman. *Pentameridæ.* **1828.**

Kongl. Vet. Acad. Handl. f. 1827, pp. 93, 100. Sole ex. l. c. p. 125, t. iv, f. 1, *a–g*. *Gypidia conchidium*, Dalman, = *Anomites c.* Wahlenberg, Act. Upsala, viii, p. 67, + *Conchidium biloculare*, Linné, Mus. Tessin. p. 90, t. v, f. 8. (Sil.) Murch. Vern. et Keys. Geol. Rus. Ural, ii, p. 116, t. 8, f. 2.

Proposed by Dalman, who considered it as partly = *Pentamerus*, Sow. which he regarded as preoccupied by *Pentamera*, Dumeril, gen. *Coleoptera*, 1806. Why does Dav. 1856, p. 173, note, state that *Uncites gryphus* is included by Dalman? It does not appear in the synonymy, nor do the figures seem to agree. (= *Conchidium*, Lin.)

Gypidia, Hall. *Pentameridæ.* **1867.**

Notice Pal. N. York, vol. iv, p. 164, Mar. 1867. Pal. N. York, vol. iv, p. 374. Type *G.conchidium*, Dalm. (= *Gypidia*, Dalm.).

Gypidium, Beyrich. *Pentameridæ.* **1837.**

Beitr. zur Kenntn. Verst. Rhein. Uebergeb.* (= *Gypidia*, Dalm.)

Gypidula, Hall. *Pentameridæ.* **1867.**

Notice Pal. N. York, vol. iv, p. 163, Mar. 1867. (Dev.) Pal. N. York, iv, pp. 373, 380, pl. 58 *a* (all), 1867. Type *Pentamerus occidentalis*, Hall, Geol. Iowa, i, part ii, p. 514, pl. vi, f. 2, 1858, but not of Hall, Pal. N. York, ii, p. 341, 1852.

Hapalosia, Agassiz. *Mollusca.* **1847.**

Nom. Zool. Index, p. 496, = *Apalosia*, Raf. corrig. q. v.

Helictopoda, Gray. *Brachiopoda.* **1848.**

Ann. Mag. Nat. Hist. ii, p. 436. Subclass Brach. cont. *Sclerobrachia*, *Sarcicobrachia*.

Helmersenia, Pander. *? Obolidæ.* **1861.**

Bull. Acad. Imp. Sci. St. Petersburg, iii, p. 47, pl. ii, f. 2, *a–q*. Type *H. jerémejeui*, Pander, l. c. (mel. *ieremieffi*). Not seen.

Helmintholithus, Linné. *Invertebrata.* **1760.**

Syst. Nat. ed. xi, ii, p. 162. Subclass inv. foss. cont. Vermes foss. incl. some brachiopods.

Hemiasterias, Herrmannsen. (*Incertæ sedis.*) **1847.**

Index Gen. Mal. i, p. 524, as of Raf. (=*Hemisterias*, R.)

Hemiprionites, Agassiz. *Strophomenidæ.* **1847.**

Nom. Zool. Index, p. 511; lapsus (=*Hemipronites*, Pand.).

Hemipronites, Pander. *Strophomenidæ.* **1830.**

Beitr. Geogn. Russ. Reiches, pp. 71, 74, t. iii, f. 14 (generic only). Section or subgenus of *Klitambonites*, fully described; first sp. p. 74, *H. tumida*, Pand. t. xviii, f. 6, *a–d*. (Sil.) (=*Klitambonites*, Pander.)

The relative application of this name and the names *Streptorhynchus*, *Leptæna*, *Strophomena*, *Plectambonites*, and *Hippariionyx* is involved in more obscurity, and has been more variously regarded by different authors, than almost any other case of a similar nature in the annals of malacological nomenclature. This has been still further complicated by the uncertainty which still exists in regard to the internal characters of most of the species, and the different values assigned by authors to these characters when they have been made known.

A reference to the various names above cited will disclose the views taken by several authors, and further elucidate the historical account which follows, when it may not appear sufficiently full.

In 1848, Bronn, in the Index Paleontologicus, i, p. 585, refers nineteen of Pander's twenty-one nominal species to "*Orthis*" *hemipronites*, von Buch (Beitr. Best. Gebirgs-Form. Russl. 1840, p. 20), including Pander's first or typical species *H. tumida*, the specific name of which, of course, is entitled to priority without regard to its generic affiliations. If this be correct, it would certainly seem, irrespective of other considerations, as if *H. tumida* (or *hemipronites*) was entitled to be considered as Pander's type. In case the genus *Hemipronites*, as typified by *H. tumida*, be synonymous with some previously named group, there would still remain *H. alata*

and *H. globosa*, Pander, to which the name *Hemipronites* might be applied if they prove distinct from any group named before 1830; and which, under Pander's name, were thus separated as a section of *Orthis* by Bronn in 1849 (iii, p. 228). To this it may be objected that the first species is represented by an unrecognizable cast of the interior, and the second bears considerable resemblance, as far as the figure is concerned, to a species of *Porambonites*. I shall therefore consider *H. tumida* and vars. as forming the typical species.

Quenstedt (Petr. Deutschl. 1871, p. 545, t. 55, f. 32–34) has figured the interior of what he states to be this species, which he regards as one of his somewhat heterogeneous group of *Orthides*, and affiliates to *Orthisina*, D'Orb. (= *Klitambonites*). The character of this interior does not appear to differ materially from that of *Klitambonites*, but, in deciding, much will depend on the view taken by each individual paleontologist as to the value of characters which appear to vary as much within the species as do the so-called generic characters between different groups of species. According to Quenstedt's figures, the difference between *O. hemipronites* (= *tumida*, type of *Hemipronites*) and *O. anomala* (= *adscendens*, teste Quenstedt, type of *Klitambonites* and first species of *Orthisina*, D'Orb.) is merely a question of degree of breadth of area and prolongation of the median ventral septum. *O. plana* seems to be of very similar type. For present purposes, it will suffice to regard *Hemipronites* and *Orthisina* as synonyms of *Klitambonites*, leaving to paleontologists the duty of determining whether there are grounds for ultimate separation of the species which they contain.

Now Davidson and some other authors have (as it seems to the writer), with evident propriety, taken Blainville's sole species (*S. rugosa*) as the type of the genus *Strophomena*, of which Blainville alone can be considered as the author; this species is generally admitted to be the same as *S. planumbona*, Hall, figured by Meek in the Paleontology of Ohio, i, p. 74, pl. 6, f. 3 *a–g*, 1873, and by Davidson, 1856, t. xi, f. 37–39.

In 1843, Vanuxem (Geol. Rep. Third Distr. N. York, p. 124,

f. 4) founded his genus *Hipparionyx* on a species to which he gave the name of *proximus*, and which has been fully illustrated by Prof. Hall under the name of *Orthis hipparionyx* in Pal. N. York, vol. iii. Subsequently Prof. Hall (Sixteenth Regent's Rep. p. 65) refers to this species as an extreme form of the genus *Streptorhynchus* of King, which, if true, would reduce Prof. King's name to a synonym, since Vanuxem's genus rests on the character of its type, and its validity is not affected by the original inclusion with that type of species not congeneric.

Prof. King, in 1850 (Perm. Foss. p. 107), erected into a genus the *Terebratula pelargonata* of Schlotheim, under the name of *Streptorhynchus*. This and *O. crenistria* were for some time afterward included by Davidson in *Orthisina* (= *Klitambonites*), but have since been separated from that connection, and recognized by him as species of *Streptorhynchus*, which he adopts as a section of *Strophomena*.

In 1864, Mr. F. B. Meek (Pal. Upper Missouri, part i, p. 25) expresses the opinion that *Streptorhynchus* is not separated by any definite characters from *Hemipronites*, as he understood it (=*Strophomena*, Blainville), and with *Hipparionyx* unites the two under Pander's name, which he adopts. In 1873 (l. c.), Mr. Meek, being unaware that Rafinesque's genus *Strophomenes* had not been described prior to Blainville's description of *Strophomena*, and relying on the statement that a specimen of the *Anomites rhomboidalis* of Wahlenburg had been labelled *Strophomena rugosa* by Rafinesque himself, proposed to adopt that as the type of *Strophomena* (a name never published by Rafinesque), and to retain the typical species of Blainville and its congeners under the name of *Hemipronites*. In Pal. Ohio, ii, p. 281, Mr. Meek reiterates his opinions of 1864 and 1873. If the propositions upon which this opinion was founded, namely, that Pander's type of *Hemipronites* was a "true *Streptorhynchus* of King", and that between the latter and the Strophomenoid forms typified by *S. planumbona* there is no difference except of degree, had proved unassailable, no question would arise as to the propriety of his conclusions.

However, since 1863, numerous investigations have re-

sulted in greater knowledge of the internal arrangements of the types of these groups, and greatly modified the former method of classification of these animals, which was based chiefly on external characters. Had Mr. Meek not been prevented from extending his investigations by the melancholy and long-continued illness which terminated in his death, it is very probable that he would have reconsidered his earlier views. At all events, it is evident that certain differences exist between the above-mentioned groups, which are apparently as important as many which have formed the basis of accepted genera, although it cannot be denied that a general and rather gradual transition may be traced between the different sections of this family. These it appears better, for the sake of discrimination, to accept for the present, leaving for the future the task of thorough correlation and subordination.

The preceding is but the beginning of these complications. In 1828, Dalman had described the genus *Leptaena* (*q. v.*) with four species (and references to others which he supposed to belong to it), which formed a heterogeneous assemblage. Of the four species from which Dalman's type must be selected, *L. euglypha*, the third, is a typical *Strophomena* (Blainville), agreeing with *S. rugosa*, Bl. (= *planumbona*, Hall), in having the dorsal (or hæmal) valve convex, while the ventral or socket valve is concave externally. The first and second, *L. rugosa*, Dalm. (= *rhomboidalis*), and *depressa*, Dalm., are, according to Mr. Davidson, mere varieties of one species. This he includes in *Strophomena*, not considering the differences by which it is distinguished from the type of the genus *Strophomena* (Blainville) to be of generic or subgeneric importance. These differences are chiefly that the relative convexity and concavity of the valves are reversed, and that certain minute differences in the form of the muscular and vascular impressions, in the grooving of the tips of the cardinal process, or of the hinge-line, have been noticed, and also some differences of form, apparently owing to the general convexity, or to the sharp geniculation of the valves in various species. The fourth species, *L. transversalis*, Dalm , exhibits differences which seemed suf-

ficient to Mr. Davidson to authorize its separation from *Strophomena* (1853, p. 108), and thus retain the name *Leptaena*, which had been so widely used in paleontological literature. This species thus became the type of the restricted genus, and the latter has very generally been adopted.

In 1830, however, Pander described his genus *Plectambonites*, in which he placed a number of species, the whole forming an assemblage apparently about equivalent to *Leptaena* or *Strophomena*, as these terms were used in their unrestricted sense by early writers. The interior of some of his species is unknown, including the first species, and there are probably both Leptænas and Strophomenas (as restricted) contained in the genus. But his first of two generic figures appears to be the dorsal valve of a species of *Strophomena* of the *rhomboidalis* type, while his *P. triangularis*, *imbrex*, and another (all vars. of one sp.), which have been examined and figured by Mr. Davidson, have the dorsal valve concave, as in *rhomboidalis*. Should therefore it be necessary (as seems improbable) to separate the genus *Strophomena* as understood by Davidson into two groups, respectively typified by *rhomboidalis* and *rugosa* (*planumbona*), Pander's name might be utilized for the former, although M'Coy has (1844) also suggested a name (*Leptagonia*) for this identical group.

Stropheodonta of Hall (1850, Pal. N. Y. ii) seems tolerably distinct from the above, if the total absence of any indication of a covered or open foramen, which is said to characterize it, be confirmed.

A different arrangement from that adopted by Davidson was proposed by Professor King, by which *S. rhomboidalis* was to represent *Leptaena*, and *L. transversalis* and congeners would be the exemplars of *Plectambonites*. Whatever may have been the points in favor of this arrangement, it may be said that no part of it was imperatively required by the rules of nomenclature, and, as another grouping has come into general use, which is at least equally conformable to those rules, it would be highly undesirable to inaugurate any further or unnecessary changes.

Orthothetes of Evans (1837, *q. v.*) is also a synonym of

Streptorhynchus or *Strophomena*. At the same time that he proposed the genus *Hemipronites*, Pander also described two other genera, founded on unimportant differences in the character of the foramen, partly natural, partly accidental to the specimens. The respective lists of species were, as in the preceding cases, chiefly made up of unimportant individual variations. Of *Orthambonites*, Bronn refers eleven out of eighteen species, including the first, to *Orthis calligramma*, Dalman, while of the genus *Gonambonites*, with twenty-four species, fourteen are referred to *Orthis inflexa*, Vern., and eight, including the first, to *O. plana*, Vern. This species is figured by Quenstedt, and is a *Klitambonites* (or *Orthisina*), and it seems at least probable, from Pander's figures, that more of his species belonged there, while others will be referable to *Strophomena*, &c. *Orthambonites* must be considered a synonym of *Orthis*, at least for the present; and there does not at present appear to be anything not referable to previously named genera in *Gonambonites*.

The conclusions to which this review of the history of these names would seem to lead, may be expressed synonymically as follows:

Genus STROPHOMENA, Blainville.

a. Strophomena (*rugosa*, Bl.), 1825, Dav. 1853.
Hemipronites (*planumbona*), Meek, 1873.
Leptaena (*euglypha*), Dalman, 1828.

b. Hipparionyx (*proximus*), Vanuxem, 1843.
Orthothetes (? *crenistria*, Phil. Evans, MSS. 1837?), Fischer, 1850.
Streptorhynchus (*pelargonatus*, Schl.), King, 1850.

bb. Plectambonites (*rhomboidalis* ?), Pander, 1830.
Strophomena (*rhomboidalis*, Wahl.), Meek, 1873.
Leptaena (*rhomboidalis*), Dalman, 1828.
Leptaena (*rhomboidalis*, Wahl.), King, 1846.
Leptagonia (*analoga*, Phil.), M'Coy, 1844.

c. Leptaena (*transversalis*), Dalman, 1828, Dav. 1853.
Plectambonites (*transversa*), King, 1850.

d. Stropheodonta (*demissa*, Conr.), Hall, 1850.

Genus KLITAMBONITES, Pander.

a. Klitambonites (*adscendens*), Pander, 1830.
Pronites (*adscendens*), Pander, 1830.
Hemipronites (*tumida*), Pander, 1830.
Gonambonites (*plana*), Pander, 1830.
Orthisina (*anomala*), D'Orbigny, 1847.

Genus ORTHIS, Dalman.

a. Orthis (*calligramma*), Dalman, 1828.
Orthambonites (*calligramma*), Pander, 1830.
Schizophoria (*striatula*), King, 1850.

Hemipronites, Meek. *Strophomenidæ.* **1873.**

Pal. Ohio, i, p. 74. Subg. *Strophomena.* Type *S. planumbona*, Hall, Dav. 1856, pl. xi, f. 37–39. (=*Strophomena*, Bl.)

Hemisterias, Rafinesque. (*Incertæ sedis.*) **1832.**

Atlantic Journal, iv, p. 142, cut. *H. quadriloba*, Raf. l. c. sole ex. (Referred by Herrm. to the Brach.)

Hemithiris, D'Orbigny. *Rhynchonellidæ.* **1847.**

Comptes Rendus, xxv, p. 268. No ex. cited. Ann. Sci. Nat. viii, p. 246; xiii, p. 322, 1850. Type *Rhynchonella psittacea*, Gmel. sp. Dav. 1856, pl. x, f. 8, 9, 10, 15, 16, 23. Syn. *Hypothyris*, Fbs. & Haul.

Hemithyris, Bronn. *Rhynchonellidæ.* **1848.**

Jahrb. Min. p. 246. (=*Hemithiris*, D'Orb. corrig.)

Heterogangliata, Owen. *Invertebrata.* **1835.**

Lect. on Comp. Anatomy (ed. 1843, p. 13). Name proposed by Owen for the subkingdom of *Mollusca*, and erroneously considered by Paetel to be equivalent to the class Brachiopoda. (=*Mollusca*, Cuv.)

Hipparionyx, Vanuxem. *Strophomenidæ.* **1842.**

Geol. Rep. Third District N. York, p. 124, f. 4. (Dev.) Type *H. proximus*, Van. l. c. =*Orthis hipparionix*, Dav. Mon. Dev. Brach. p. 90. Hall, 16th Reg. Rep. p. 65, f. 6. Ibid. Pal. N. York, iii, p. 407, pl. 89, f. 1–4; pl. 90, f. 1–7; pl. 91, f. 4, 5; pl. 94, f. 5, 1859. Some sp. of *Atrypa* were included in Vanuxem's list. Syn. *Streptorhynchus*, King.

Hipponyx, Morris. *Gasteropoda.* **1843.**

Brit. Foss. p. 121. Gen. gast., sp. ad Brach. ref. Morris in err.

Histerolithus, Auctt. (*Incertæ sedis.*)

Cf. *Hysterolithus.*

Hinniphoria, Bronn. *? Terebratulidæ.* **1862.**

Bronn, Klass. u. Ordn. Thierr. 1ste Abth. p. 309, 1862, in list. (Jura.) (Cf. *Hynniphoria*, Suess.)

Hynniphoria, Suess. *? Terebratulidæ.* **1858.**

Beitr. Paleont. Oesterr. von Hauer, Bd. i, Heft 2, p. 44, t. v, f. 4–8. Type *H. globularis*, Suess. l. c. (I have not access to this work.)

The relations of this genus appear doubtful.

Hynniphoria, Quenstedt. *Terebratulidæ.* **1871.**

Petref. Deutschl. ii, p. 403, as of Suess. Ex. *Terebratula cubica*, Quenstedt, l. c. atlas, pl. 49, f. 90, 91.

Hypodema, Koninck. *Coelenterata.* **1852.**

Notice sur les gen. Hypodema, &c. p. 12, pl. ii, f. 1–3, *a–d.* (Carb.) Type *Calceola Dumontana*, Kon. (1843), l. c.

Hypothyridæ, Morris. *Arthropomata.* **1846.**

Quart. Journ. Geol. Soc. Lond. ii, p. 387. Division *Terebratulidæ* cont. sections characterized by their sculpture or form.

Hypothyridæ, King. *Arthropomata.* **1850.**

Perm. Foss. p. 81. Fam. Brach. cont. *Isorhynchus, Hypothyris, Camerophoria, Uncites, Pentamerus.*

Hypothyridæ, Quenstedt. *Arthropomata.* **1871.**

Petref. Deutschl. ii, p. 27. Subsect. *Terebratulidæ* cont. *Rhynchonella, Camerophoria, Camarella, Atrypa, Pentamerus, Uncites, Strigocephalus, Pectunculus.*

Hypothyris, Phillips. *? Rhynchonellidæ.* **1841.**

Pal. Fos. Cornwall & Devon. p. 55. "Beak acute; perforation below it;" only diagnosis; no ex. cited and the name not used in the specific descriptions.

Hypothyris, King. *Rhynchonellidæ.* **1846.**

Ann. Mag. Nat. Hist. xviii, p. 28. First sp. *H. cuboides,* Sow. sp. Geol. Trans. v, p. 704, t. 56, f. 17. Dav. Mon. Dev. Brach. p. 65, t. xiii, f. 17–21. (= *Rhynchonella,* Fisch.)

Hypothyris, Forbes and Hanley. *Rhynchonellidæ.* **1853.**

Brit. Moll. ii, p. 346. Sole ex. *Anomia psittacea,* Gmel. S. N. i, F. & H. l. c. pl. lvii, f. 1–3. (= *Hemithiris,* D'Orb.)

Hysterolites, Schlotheim. (*Incertæ sedis.*) **1820.**

Petref. p. 247, pl. xvi–xviii. Subsect. *Terebratulites* cont. spinose fossil brachiopods. (Cf. *Hysterolithus.*)

Hysterolithes, Link. (*Incertæ sedis.*) **1809.**

Beschr. Rostock, Samml. iv, p. 29. (Cf. *Hysterolithus.*)

Hysterolithos, Grew. (*Incertæ sedis.*) **1681.**

Mus. Soc. Reg. p. 258. Non-binomial. (Cf. *Hysterolithus.*)

Hysterolithus, Aldrovandus. (*Incertæ sedis.*) **1648.**

Mus. met. p. 597. Non-binomial. Followed by Walch, Waller, Schröter, and other non-binomial authors. Included globose, spinose fossil bi-

Iphidea, Billings. *Arthropomata?.* **1874.**

Pal. Fos. Canada, ii, pt. i, (Aug.) p. 76, f. 44. Type *I. bella*, Billings, l. c. (Sil.) Interior unknown.

Allocated to *Kutorgina* and *Acrotreta* by Billings; but the figure resembles a small valve of *Klitambonites anomala* (*Orthisina anomala*, Dav. 1856, f. 21), Schlotheim.

Isilia, Rafinesque. *Arthropomata.* **1831.**

Mon. Biv. Shells Ohio, p. 7. Sect. Terebrariorum cont. *Terebratula*, *Spinifer*, *Gonotrema*, *Amblotrema*.

Ismenia, King. *Terebratulidæ.* **1850.**

Perm. Foss. pp. 81, 142 (not p. 245). Type *Terebratulites pectunculus*, Schlotheim, Quenst. Handb. Petr. p. 466, pl. 37, f. 23–25. Ibid. Gray, B. M. Cat. p. 104. (= *Megerlia*.)

Ismenia, King (2). *Terebratulidæ.* **1850.**

Perm. Foss. p. 245, (not pp. 81, 142). Type *Terebratulites pectunculoides*, Schlotheim, Quenst. Handb. Petr. p. 464, pl. 37, f. 15–18. (Not of Gray nor of King, p. 142.) (= *Terebratella*, D'Orb.)

Ismenia, Dall. *Terebratulidæ.* **1871.**

Am. Journ. Conch. vii, p. 6. Subg. *Megerlia*, King. Type *Terebratula sanguinea*, Sow. Thes. Conchyl. i, p. 357, pl. 71, f. 71–73. (= *Ismenia*, Gray; King, p. 142; + *Frenula*, Dall.)

Isorhynchus, King. *Porambonitidæ.* **1850.**

Perm. Foss. p. 112. Type *Terebratulites æquirostris*, Schl. Verneuil, Geol. Rus. ii, pl. iii, f. i. Cf. Dav. 1853, p. 99, t. vii, f. 120–126. (= *Porambonites*, Pand.)

Keyserlingia, Pander. *Obolidæ?* **1861.**

Bull. Imp. Acad. Sci. St. Petersburg, iii, p. 46, pl. ii, f. 1 *a–g*. Type *Orbicula reversa*, Verneuil, Pander, l. c. Not seen. (Cf. *Obolella*.)

Kingena, Davidson. *Terebratulidæ.* **1852.**

Mon. Brit. Cret. Brach. p. 42, t. iv, f. 15–28, t. v, f. 1–4. Type *Terebratula lima*, Defrance, Dict. Sci. Nat. liii, p. 156, 1828. Davidson, l. c. subg. *Terebratella*.

Klitambonites, Pander. *Strophomenidæ.* **1830.**

Beitr. Geogn. Russ. Reiches, p. 70, t. iii, f. 14, t. xxviii, f. 16, 17. First sp. *Pronites adscendens*, Pander, p. 72, pl. xvii, f. 6, Dav. 1856, pl. xi, f. 24, 26 (+ *P. alta*, P. l. c. f. 5, = var. præc. teste Murchison; Chenu, Man. ii, p. 223, f. 1147, 1862). Sil.

(Syn. *Pronites*, Pander, not Illiger; *Gonambonites*, Pander, *Orthisina*, D'Orb.)

Genus fully described and all the species divided between the subgenera *Pronites* and *Hemipronites* (*q. v.*). The figures cited are given as generic merely. The first sp. of *Pronites* (*adscendens*, P.) must be taken as the type of the genus, especially as *Pronites* is preoccupied by Illiger for a

genus of birds, and also because one of the subgenera must be left by the rules of nomenclature to contain the typical species, and therefore *Pronites* would necessarily lapse even if it were not pre-occupied.

Koninckia, Woodward. *Atrypidæ.* **1854!**

Man. Rec. & Foss. Shells, p. 231, f. 145; Bronn, Thierr. iii, i, 302, 1862. Type *Producta Leonhardi*, Wissm.; lapsus, = *Koninckina*, Suess.

Koninckina, Suess. *Atrypidæ.* **1853.**

Davidson, 1853, p. 92. Type *Producta Leonhardi*, Wissm. Dav. l. c. pl. viii, f. 194–198. (Trias.)

Koninckinidæ, Davidson. *Arthropomata.* **1853.**

Intr. p. 51. Fam. Brach. cont. *Koninckina.*

Kortugina, Davidson. *Obolidæ.* **1871.**

Mon. Sil. Brach. expl. pl. l. lapsus, = *Kutorgina*, Bill.

Kraussia, Davidson. *Terebratulidæ.* **1852.**

Ann. Mag. Nat. Hist. ix, p. 369. Type *K. rubra*, Dav. l. c. = *Anomia rubra*, Pallas, Mis. Zool. pl. xiv, f. 2, 11, 1766. Reeve, Conch. Icon. ix, f. 37, *a–c.* Not *Kraussia*, Dana, 1852, gen. crustac. (= *Kraussina* Dav.)

Kraussina, Davidson. *Terebratulidæ.* **1859.**

Sitzungsb. K. Ak. Wiss. Wien, Bd. 37, p. 210, and Annals Mag. Nat. Hist. 1861, p. 39. Proposed for *Kraussia*, Dav. præoc. by Dana in Crustacea.

Kraussinina, Paetel. *Terebratulidæ.* **1875.**

Fam. u. Gatt. Moll. p. 104, lapsus, = *Kraussina*, Dav.

Kraussininæ, Dall. *Terebratulidæ.* **1870.**

Am. Journ. Conch. vi, p. 100. Subfam. *Terebratulidæ* cont. *Kraussina.*

[redacted]

lings, but also to a different generic group. Whether this be identical with a described genus, or whether it is still uncharacterized, is doubtful, and cannot be decided until the interior is known. Such valves have been identified with *Obolella Phillipsi*, Holl (Quart. Journ. Geol. Soc. xxi, p. 101–2, f. 10 *a–b*, 1864, by Messrs. Holl and Davidson (l. c.), which has been figured by Davidson (Mon. Sil. Brach., pp. 62, 342, pl. iv, f. 17–19, 1866, and pl. l, f. 25, 1870). Mr. Whitfield, who kindly called the writer's attention to the dissimilarities between Billings's figures, is of the opinion that *O. Phillipsi* belongs to an undescribed generic group.

Lampas, Meuschen. *Arthropomata.* **1787.**

Mus. Gev. p. 438. Non-binomial. (Cf. *Lampas*, Humph.)

Lampas, (Humphrey) Anonymous. *Arthropomata.* **1797.**

Mus. Calonn. p. 45 (May). No diagnosis or references. First sp. *Anomia terebratula*, Lin. Other sp. are *Rhynchonella*, *Megerlia*, &c. (= *Terebratula*, Müller.)

Lampus, Sowerby. *Arthropomata.* **1842.**

Conch. Man. ed. ii, p. 169, lapsus, = *Lampas*, Humphr.

Laqueus, Dall. *Terebratulidæ.* **1870.**

Am. Journ. Conch. vi, p. 123, subg. *Terebratella*. Type *Terebratula californica*, Koch, Dall, l. c. pl. vii, fig. *f*, pl. viii, fig. 9–10.

Leiorhynchus, Hall. *Rhynchonellidæ.* **1860. / 1861?**

13th Regent's Rep. p. 75. Types *Atrypa quadricostata*, Hall, l. c. p. 86, & Rep. Fourth Distr. N. York, p. 223, f. 2; and *Atrypa mesacostalis*, Hall, l. c. p. 86 (Chem.) & Note on Foss. Chemung Group, p. 64, f. 1 *a–b*. Not *Liorhynchus*, Rud. gen. Coleopt. (Cf. *Meristella*, Hall, 1862, not 1861.

Leptaena, Dalman. *Strophomenidæ.* **1828.**

Kongl. Vet. Acad. Handl. 1827, pp. 93, 94. First sp. p. 106, *Producta rugosa*, Hisinger, Act. Holmiæ, 1826, p. 333. Dalman, l. c. pl. i, f. 1, = *Anomites rhomboidalis*, Wahl. Act. Upsal. viii, p. 65. (This and *L. depressa*, Dalman, second sp. p. 107, t. i, f. 2, + *L. euglypha*, Dalman, third sp. l. c. p. 108, t. i, f. 3, *a–b*; Hisinger sp. Bidr. Sver. Geogn. t. vi, p. 4, —are true Strophomenas fide Davidson.) Fourth sp. l. c. p. 109, t. i, f. 4 *a–d*. *L. transversalis*, Dalman, is taken by Davidson as type, 1853, pl. viii, f. 176–180; 1856, pl. xii, f. 1–5.

Leptaena, M'Coy. *Productidæ.* **1844.**

Carb. Foss. Ireland, pp. 105, 118. First sp. *L. convoluta*, Phillips, Pal. Foss. Cornwall & Devon, p. 57, pl. 24, f. 96. In the diagnosis, however, *L. lata*, von Buch, (= *Chonetes striatella*, Koninck, Mon. *Chonetes*, p. 200, pl. xx, f. 5 *a–g*), is mentioned in a way to indicate it as M'Coy's type. (= *Chonetes*, Fisch.)

Leptaena, King. *Strophomenidæ.* **184**

Ann. Mag. Nat. Hist. xviii, pp. 28, 36. 1st sp. *L. rugosa*, Dalm. (= *rhomboidalis*). Ibid. Perm. Foss. 1850, p. 81, 104, same type, and adds *L. analoga*, Phillips, as also typical, = *Leptaena*, Dalman, pars, not Dav. = *Strophomena*, Davidson pars. (= *Plectambonites*, Pander.)

Leptaena, Davidson. *Strophomenidæ.* **185**

Intr. p. 108. Type *L. transversalis*, Dalm. pl. viii, f. 176–180. Ibid. 1856, p. 205, same type, pl. xii, f. 1–5. Syn. *Plectambonites*, King; not *Leptaena*, King.

Leptaenacea, F. Braun. *Arthropomata.* **184**

Bayr. Petref. p. 45. Fam. Brach. cont. *Leptaena.*

Leptaenalosia, King. *Productidæ.* **184**

Murch. Verneuil & Keys. Geol. Rus. Ural, ii, p. 281. (King, olim.) (= *Strophalosia*, King.)

Leptagonia, M'Coy. *Strophomenidæ.* **184**

Carb. Foss. Ireland, p. 116, f. 11–13. First sp., also mentioned in diagnosis, *Producta analoga*, Phillips, Geol. Yorkshire, 1836, p. 215, pl. vii, f. 10. M'Coy, l. c. p. 117, f. 13. (= *Plectambonites*, Pand.)

Leptobolus, Hall. *Obolidæ.* **187**

24th Regent's Rep. p. 226, pl. vii, f. 19–20. Oct. (Hudson R. group). Type *L. lepis*, Hall, l. c. Ibid. Hall & Whitfield, Ohio Pal. ii, p. 69, 1875. (See *Aulonotreta*, Kutorga.)

Leptobulus, Hall. *Obolidæ.* **187**

24th Regent's Rep. p. 226, passim, lapsus, = *Leptobolus.* Ibid. U. P. James, Cat. Foss. Cincin. 1875.

Leptocoelia, Hall. *Atrypidæ.* **185**

10th Regent's Rep. p. 107. No diagn. First sp. *L. concava*, Hall, Pal. N. York, iii, pl. 38, f. 1–7. (Group heterogeneous.)

Leptocoelia, Hall. *Terebratulidæ?* **185**

Leptogonia, Agassiz. *Strophomenidæ.* **1847.**

Nom. Zool. Index, p. 593, lapsus, = *Leptagonia,* M'Coy.

Les Acardes, Desmoulins. *Invertebrata.* **1826.**

Bull. Hist. Nat. Soc. Lin. de Bordeaux, i, p. 241. Fam. incl. *Sphærulites, Hippurites, Calceola.* Not of Rang.

Les Cranies, Ferussac. *Brachiopoda.* **1819.**

Tabl. Syst. p. xxxviii. Fam. Brach. cont. *Orbicula, Crania, Thecidea.*

Les Cranies, Rang. *Lyopomata.* **1829.**

Man. Moll. p. 262. Fam. Brach. cont. *Crania, Orbicula, Discina.*

Les Lingules, Ferussac. *Lyopomata.* **1819.**

Tabl. Syst. p. xxxviii. Fam. Brach. cont. *Lingula.* Ibid. Rang, Man. Moll. p. 257, 1829.

Les Orbicules, Cuvier. *Lyopomata.* **1798.**

Leçons d'Anat. Comp. i, p. 5. Fam. Brach. cont. *Crania, Orbicula.*

Les Ostracées, Lamarck. *Invertebrata.* **1809.**

Phil. Zool. (ed. 1830, p. 317). Fam. incl., among other things, *Crania.*

Les Terebratules, Ferussac. *Arthropomata.* **1819.**

Tabl. Syst. p. xxxviii. Fam. Brach. cont. *Terebratula, Magas.*

Les Terebratules, Rang. *Invertebrata.* **1829.**

Man. Moll. p. 258. Fam. cont. *Terebratula, Pentastère, Strygocephale, Spirifère, Magas, Strophonema, Thecidea, Calceola.*

Libera, Fleming. *Arthropomata.* **1828.**

Brit. An. pp. 225, 367. Fam. Brach. cont. *Pentamerus, Productus.* Not *Libera,* De Haan.

Ligula, Cuvier. *Lingulidæ.* **1798.**

Tabl. Élém. p. 435 (not p. 634). Sole ex. *L. unguis,* L., lapsus, =*Lingula,* Brug. In index and text, passim, "*Lingule*". Not *Ligula,* Cuvier, p. 634; Humphrey; Montague, &c. (= *Lingula,* Brug.)

Ligularius, Dumeril. *Lingulidæ.* **1806.**

Zool. Anal. p. 170; from *Ligula,* Cuvier. Dumeril had a mania for terminating all names in *arius.* (= *Lingula,* Brug.)

Lingula, Brugiere. *Lingulidæ.* **1792.**

Enc. Méth. i, pl. 250. No diagnosis or specific name cited. The figure resembles *L. anatina.* Ib. Lam. Prodrome, 1799, p. 89. Sole ex. *Patella unguis,* Lin. = *L. anatina,* Lam. Dav. 1856, p. 243, pl. xiv, f. 24–31. Syn. *Pharetra,* Bolten, 1798.

Lingulacea, Blainville. *Invertebrata.* **1818.**

Dict. Sci. Naturelles, x, table, olim. Fam. Brach. cont. *Lingula, Terebratula, Orbicula, Sphærulites?.*

Lingulacea, Menke. *Lyopomata.* **1830.**

Syn. Mus. Menkeanum, ed. ii, p. 95. Fam. Brach. cont. *Lingula.* =*Lingulidæ,* Gray.

Lingulaceæ, Menke. *Lyopomata.* **1828.**

Syn. Mus. Menkeanum, ed. i, p. 56. Fam. Brach. cont. *Lingula.* Adt. Hinds, Voy. Sulph. Zool. p. 71.

Linguladæ, "Bromh." Gray. *Lyopomata.* **1838.**

Charlesworth's Mag. ii, p. 418. P. Z. S. 1847, p. 202. Fam. Brach. cont. *Lingula.*

Lingulæ, Eichwald. *Brachiopoda.* **1829.**

Zool. Spec. i, p. 272. Tribe cont. *Lingula, Crania, Orbicula, Terebratula, Obolus.*

Lingulæ, Deshayes. *Lyopomata.* **1830.**

Enc. Méth. iii, p. 553, tabl. Fam. Brach. cont. *Lingula.*

Lingularia, Rafinesque. *Lyopomata.* **1831.**

Mon. Biv. Shells Ohio, Suppl. p. 7. Fam. Brach. cont. *Lingula.* (=*Lingulidæ*, Gray.)

Lingularius, (Dumeril ?) Herrmannsen. *Lingulidæ.* **1806.**

Zool. Anal. p. 168, fide Herrm. (= *Lingula*, Brug.)

Lingulella, Salter. *Lingulidæ.* **1866.**

Mem. Geol. Survey Great Brit. iii, p. 333, 1866. (Sil.) Type *L. Davisii*, M'Coy. (Salter, l. c. t. ii, f. 7–12; t. iv, f. 14.) Ann. Mag. Nat. Hist. 2d ser. viii, p. 105. Davidson, Mon. Sil. Brach. p. 56, pl. iv, f. 1–16.

Lingulepis, Hall. *Lingulidæ.* **1863.**

16th Regent's Rep. p. 129, pl. vi, f. 15–16. Sole ex. *L. pinnæformis*, Hall, l. c. (Sil.) = *Lingula p.* Owen, Geol. Rep. Wis., Iowa and Minn., p. 583, pl. 1 B, f. 468.

Lingulidæ, Gray. *Lyopomata.* **1840.**

Syn. Brit. Mus. i, p. 155. Fam. Brach. cont. *Lingula.* Id. 1848, Ann.

Lingulops, Hall. *Trimerellidæ.* **1871.**

23d Regent's Rep. 1873, p. 245, pl. 13, f. 1–2. (Extras, Mar. 1871, fide Hall.) Sil. Type *L. Whitfieldi*, Hall, l. c. Id. Davids. & King. Quart. Journ. Geol. Soc. London, 1874, p. 164, pl. xix, f. 9 *a*, p. 165, f. 3.

Lyopomata, Owen. *Brachiopoda.* **1858.**

Encyc. Brit. ed. viii, xv, art. Mollusca, p. 339. Order cont. the inarticulate brachiopods.

Lyra, Cumberland. *Terebratulidæ.* **1816.**

Not formally proposed, but referred to by Sowerby in Min. Conch. 1816, t. 138, f. 4–6 (Germ. ed. p. 188). Type *L. Meadii*, Cumb. MSS. = *Terebratula lyra*, Sby. l. c. Dav. 1856, pl. vii, f. 22–24. Subg. *Terebratella*. Syn. *Trigonosemus* sp. König; *Terebrirostra*, D'Orb. Not *Lyra*, Linné, Griffiths.

Macandrevia, King. *Terebratulidæ.* **1859.**

Proc. Dublin Univ. Zool.-Bot. Assoc. i, p. 261. Type *Terebratula cranium*, Mull. Prodr. Zool. Danica, p. 209, 1776. (Recent.) Rve. Conch. Icon. iii, f. 6. Founded on a broken specimen. Not *Macandrevia*, Gray, 1850, gen. *Porifera*. (= *Eudesia*, King.)

Macrilia, Rafinesque. *Brachiopoda.* **1831.**

Mon. Biv. Shells Ohio, p. 7. Sect. Terebrar..cont. *Diclisma, Apleurotis, Trigorima, Magas, Obovites.*

Magas, Sowerby. *Terebratulidæ.* **1816.**

Min. Conch. ii, p. 39. Sole ex. *M. pumila*, Sow. l. c. t. 119, f. 1–5. (Cret.) Gray, B. M. Cat. p. 99, f. 9–10.

Magasella, Dall. *Terebratulidæ.* **1870.**

Am. Journ. Conch. vi, p. 134. Type *M. evansi*, Dav. P. Z. S. London, 1852, p. 77, pl. xiv, f. 7–9. Subg. *Terebratella*, D'Orb. (Recent.)

Magasidæ, D'Orbigny. *Terebratulidæ.* **1847.**

Comptes Rendus, xxv, p. 268. Fam. Brach. cont. *Magas, Terebratulina.*

Magasidæ, King. *Terebratulidæ.* **1850.**

Perm. Foss. p. 81. Fam. Brach. cont. *Magas, Bouchardia.*

Magasina, Gray. *Terebratulidæ.* **1853.**

Brit. Mus. Cat. Brach. p. 85. Tribe Brach. cont. *Terebratella?, Trigonosemus, Magas, Bouchardia, Waltonia?, Morrisia, Megerlia, Kraussia.*

Magasinæ, H. and A. Adams. *Terebratulidæ.* **1858.**

Genera Rec. Moll. ii, p. 576. Subfam. cont. *Terebratella, Magas, Bouchardia, Kraussia, Megerlia, Morrisia.*

Magasinæ, Dall. *Terebratulidæ.* **1870.**

Am. Journ. Conch. vi, p. 99. Subfam. Brach. cont. *Terebratella, Megerlia, Magas, Ismenia, Magasella.*

Majas, Keferstein. *Terebratulidæ.* **1829.**

Zeitung Geogn. p. 81; lapsus, = *Magas*, Sow. (Cret.)

Lingulaceæ, Menke. *Lyopom· æ.* **187**

Syn. Mus. Menkeanum, ed. i, p. 56. Fam. Brach. cont. *Lingula* no. 4, and in Hinds, Voy. Sulph. Zool. p. 71. n. incert.

Linguladæ, "Bromh." Gray.

Charlesworth's Mag. ii, p. 418. P. Z. S. 1847, p. 20 *Spiriferidæ.* **18**
cont. *Lingula.* *Spirifera decora,*

Lingulæ, Eichwald. m. Foss. 1850, p. Syn. *Ambocœlia,*

Zool. Spec. i, p. 272. Tribe cont. *Lingula, Crani Obolus.*

Strophomenidæ. **18**

Lingulæ, Deshayes. *Plicatula striatocostata,*

Enc. Méth. iii, p. 553, tabl. Fam. Brach ed St. J. l. c. (Dev.)

Lingularia, Rafinesque.

Mon. Biv. Shells Ohio, Suppl. p. 7. T *Terebratulidæ.* **18**
gulidæ, Gray.) p. 51 (Dev.), t. i, f. 1-5,

Lingularius, (Dumeril ?) H l. c. Not *Meganteris* (sp.),

Zool. Anal. p. 168, fide Herrm *Brachiopoda.* **1**

Lingulella, Salter. = *Lingula,* Raf.

Mem. Geol. Survey Gre *Brachiopoda.* **1**
visii, M'Coy. (Salter, l. cited. Gen. incert.
Hist. 2d ser. viii, p. 105.

Terebratulidæ. **1**

Lingulepis, Hall. *Magas,* Sow.

16th Regent's Rep
l. c. (Sil.) = *Ling* *Terebratulidæ.* **1**
pl. 1 B, f. 468. No ex. cited. Pal. Franç. Terr.

Lingulidæ, Type *Anomia detruncata,* = *A.*
Syn. Brit. viii, p. 96, t. 78, f. 705. Davidson, 1856,
Megathyris.) Syn. *Aragiope,* Desl. not

Mentzelia, Quenstedt. *Spiriferidæ.* **1871.**

Petref. Deutschl. ii, p. 522; Atlas, pl. 54, f. 58-61. Type *Spirifer medianus*, Quenst. l. c. Handb. Petr. 1851, p. 482, t. 38, f. 33. (Lias.)

Merista, Suess. *Spiriferidæ.* **1851.**

Jahrb. K. K. Geol. Reichs. ii, part iv, pp. 150, 160. Type *M. herculea*, Barrande, Brach. Sil. Bohm. t. 14, f. 1, (Sil.); fide Dav. 1856, pl. ix, f. 32-35. Chenu, Man. ii, p. 217, f. 1112, 1862.

Davidson, 1856, includes *Atrypa tumida*, Dalm., among the types of *Merista*, but it appears (1861) not to be congeneric, and is type of *Meristella*, Hall, 1861; not of Hall, 1859 or 1862. Billings, Ann. Mag. Nat. Hist. xx, p. 233 et seq., proposes to retain for (1) *Athyris*, M'Coy, *Atrypa tumida* as type, as has been done by Davidson in 1853. In 1852 (not 1844), M'Coy had included this sp. in *Athyris*. He would preserve (2) *Spirigera*, D'Orbigny, with *S. concentrica* as type, like Davidson in 1853. Lastly, he would separate (as above) *A. tumida* from *Merista*, leaving *M. herculea*, Barr., as type. This cannot be adopted. The laws of nomenclature being framed to exclude doubt in every practicable case, it cannot be admitted that a type may be selected for a genus which the author in his original construction of the genus did not specifically include in it. Any other course would open the door to a host of misconceptions. Therefore, Billings's proposition cannot be entertained:

First, because *A. tumida* was not included by M'Coy in his original description and list of Athyrides;

Secondly, because *Spirigera*, founded on what was properly taken to be M'Coy's type of 1844, was avowedly intended to supersede *Athyris* as an ineligible name; though, in the latter case, *Seminula* or *Actinoconchus* would have had prior claims for adoption;

Lastly, because Hall, in 1860, had already made *tumida* the type, or included it among his types of *Meristella*, positively characterized for the first time in that year.

There is therefore no reason for disturbing Mr. Davidson's judicious and widely adopted arrangement of 1856.

Meristella, Hall. *Spiriferidæ.* **1859.**

12th Regent's Rep. (Oct. 1859), p. 78, note. No diagnosis; sole ex. cited, *Atrypa naviformis*, Hall, Pal. N. York, i, pl. xxiv, f. 1 *a-c*. Ib. ii, p. 76. (Sil.) Comp. *Meristina*, Hall.

Meristella, Hall. *Spiriferidæ*. 186 186

13th Reg. Rep. p. 74, (Dec. '60 or Jan. '61). *Atrypa tumida*, Dalm. (Dav. Mon. Sil. Brach. p. 109, pl. xi, f. 1–13), mentioned, in preliminary remarks, as belonging to the new group. First sp. cited in list of American examples, *M. lævis*, Hall, l. c. (cf. *Charionella*).

As *Atrypa tumida*, Dalm., which has unwisely been included in *Athyris* and *Merista* (and which, for reasons previously given, cannot be said to be typical of either), if distinct from these forms as originally typified, remains free to be described generically, it would seem as if this name, as here applied, might stand, unless objection be raised from its previous application to *Atrypa naviformis*.

Ieristella, Hall, (olim) MSS. 18(

15th Regent's Report, pp. 179, 180. Extra copies, pp. 151–2, Dec. 1862. Types cited, (1) *Atrypa quadricostata*, Hall, Geol. Rep. 4th Dist. N. York, p. 223, f. 2; (2) *Atrypa multicosta*, Hall, 15th Reg. Rep. p. 181, f. 14, 15, and p. 190; extra copies, pp. 153, 162; (3) *A. mesocostalis*, Hall, Rep. l. c. p. 191; extras, p. 163, f. 1 *a–c*. (= *Leiorhynchus*, Hall, 1860–1.)

It appears, from a note of Professor Hall in the 15th Regent's Rep. p. 148 (extra copies), that during the long delay which took place between the presentation and the printing (partially) of the 13th Report and its final publication, some changes were considered desirable by him, and accordingly were made, in the printing-office, some time before its publication. Some proof-sheets having come into the possession of various persons before the above

[redacted]

Meristina, Hall. *Spiriferidæ.* **1867.**

Notice Pal. N. York, vol. iv, Mar. 1867, p. 157, cut. Pal. N. Y. vol. iv, p. 299, cut. Sole ex. *M. maria*, Hall, l. c. (Sil.) (?= *Meristella*, Hall, 1859.)

Mesopygia, Quenstedt. *Arthropomata.* **1871.**

Petref. Deutschl. ii, p. 21. Substitute proposed for *Apygia*, Bronn.

Mesotreta, Kutorga. *Siphonotretidæ?* **1848.**

Verh. Kais. Min. Ges. St. Petersburg f. 1847, p. 271, t. vii, f. 4 *a–c*. Type *Siphonotreta tentorium*, Kut. l. c. (Sil.)

Monobolina, Salter. *Obolidæ.* **1865.**

Mem. Geol. Surv. Great Brit. iii, p. 334. (Sil.) Type *M. plumbea*, Salter, Siluria, ed. ii, p. 50, Foss. pl. 8, f. 1, 1859. Dav. Mon. Sil. Brach. pl. iv, f. 20, 27, p. 61. Subgen. *Obolella*, Bill.

Monomerella, Billings. *Trimerellidæ.* **1871.**

Canadian Nat. new ser. vi, p. 220, Dec. 29, 1871. Type *M. prisca*, Bill. l. c. p. 221. Dav. & King, Quart. Journ. Geol. Soc. Lond. May, 1874, p. 156, pl. xvii, f. 5–8. (Sil.)

Morrisia, Davidson. *Terebratulidæ.* **1852.**

Ann. Mag. Nat. Hist. May, 1852, p. 371. (Rec.) Type *Terebratula anomioides*, Scacchi, in Philippi, Moll. Sicil. ii, p. 69, pl. xviii, f. 9, 1844. (= *Platidia*, Costa.)

Musculus, Quenstedt. *Terebratulidæ.* **1871.**

Petref. Deutschl. ii, p. 27, 384; Atlas, pl. 48, f. 70–74; gen. Epithyrid. (Cret.) Type *Terebratula biplicata* var. *acuta*, von Buch, Abhandl. Berliner Akad. 1833, p. 128; Quenst. l. c. = *Musculus anomius*, Sch. Mus. dil. p. 75, 1716. (Non-binomial.) Not *Musculus*, Klein, Raf. and others. (= *Terebratula*, Mull.)

Notremidia, Rafinesque. (*Incertæ sedis.*) **1818.**

Am. Monthly Mag. iv, p. 356. Subfamily including *Orbicula* and an imaginary genus *Notrema*.

Nucleata, Quenstedt. *Terebratulidæ.* **1871.**

Petref. Deutschl. ii, p. 27, t. 47, f. 93–98. Sect. *Epithyridæ*. Type *Terebratula nucleata*, Schlotheim, Petref. p. 281, 1820; Quenst. l. c. (= *Terebratula*, Müller, *senso stricto*.)

Nucleospira, Hall. *Spiriferidæ.* **1859.**

12th Regent's Rep. (Oct.), p. 23–25. Type *N. ventricosa*, Hall, l. c. p. 25–6, f. 1–8; Pal. N. York, iii, p. 219, 1859. Same type, pl. xiv, f. 1, pl. xxviii^{b}, f. 2–9. (Sil.)

Nummulus, Waller. *Craniidæ.* **1778.**

Syst. Min. ii, p. 500. Non-binomial. (= *Crania*, Retz.)

Numulus, Agassiz. *Craniidæ.* **1846.**

Nom. Zool. fasc. ix, 1846, p. 60. (= *Nummulus*, Wall.)

Obolella, Billings. *Obolidæ.* **1861.**

New sp. L. Sil. Foss. i, pp. 6–7, f. 7 *a–d*. Type *O. chromatica*, Bill. l. c. (December).

Obolellina, Billings. *Trimerellidæ.* **1871.**

Canadian Nat. new ser. vi, p. 220, Dec. (Sil.) Type *Obolus galtensis*, Billings, l. c. p. 222. Pal. Geol. Surv. Canada, p. 168, f. 161, Jan. 1862. (= *Trimerella*, B.)

Obolidæ, King. *Lyopomata.* **1846.**

Ann. Mag. Nat. Hist. xviii, p. 28. Fam. Brach. cont. *Obolus.*

Obolinæ, Dall. *Lingulidæ.* **1870.**

Am. Journ. Conch. vi, p. 100. Subfam. Brach. cont. *Obolus, Obolella, Monobolina, Spondylobolus.*

Obolus, Eichwald. *Obolidæ.* **1829.**

Zoöl. Spec. i, p. 274. (Sil.) Type *O. apollinis*, Eich., Schl. sp. Dav. 1853, p. 136, pl. ix, f. 280-284. Syn. *Aulonotreta*, pars, Kut.; *Ungula*, Pander; *Ungulites*, Bronn.

Obovites, Rafinesque. *Brachiopoda.* **1831.**

Mon. Biv. Shells Ohio R. p. 7. No ex. cited. Gen. incert.

Obulus, Quenstedt. *Obolidæ.* **1871.**

Petref. Deutschl. ii, p. 732; lapsus, = *Obolus*, Eichw.

Onychites, Mercati. *Brachiopoda.* **1717.**

Met. Vatic. p. 330 (non-binomial), and subsequent writers, for a group of brachiopods with deeply incurved umbones, like *Stringocephalus, Gypidia*, and some *Rhynchonellæ.*

Orbicella, D'Orbigny. *Discinidæ.* **1847.**

Comptes Rendus, xxv, p. 269. No ex. cited. Ann. Sci. Nat. xiii, 1850, p. 350. No ex. cited. Prodr. Pal. Strat. 1849, p. 20. No type selected, first two sp. cited as of "D'Orb. 1847". 1st sp. *O. Buchii*, Verneuil, Murch. Geol. Russ. Ural, ii, p. 288, t. 19, f. 1. 2d sp. *O. punctata*, Sowerby, in Murchison's Siluria (ed. iii), p. 212, f. (35) 1, pl. v, f. 17. (L. Sil.) Dav. Mon. Sil. Brach. p. 69, pl. vi, f. 9. 9th (last) sp. cited *O. terminalis*, "D'Orb. 1848", Conrad, in Emmons, Geol. N. York, iv, p. 395, f. 4, 1842. Dav. 1856, xiv, f. 4-7. In the absence of other information, *O. Buchii* may be taken as the type. (= *Trematis*, Sharpe.)

Orbicula, Cuvier. *Craniidæ.* **1798.**

Tabl. Élém. d'Hist. Nat. p. 435. Type *Patella anomala*, Mull. = *Crania an.* Dav. 1856, pl. xiii, f. 24, 32, 33, 35, 36. (Recent.) Lamarck, Prodr. p. 83, 1799. Type *O. norvegica*, Lam. non Sow. = *Crania anomala.* Ib. Syst. An. s. Vert. 1801, p. 140, same type. (= *Crania*, Retz.)

Orbicula, Sowerby. *Discinidæ.* **1830.**

Min. Conch. vi, p. 4, pl. 506. Ex. *O. reflexa*, Sow. l. c. G. B. Sowerby, Conch. Man. ed. ii, p. 209, 1842. Thes. Conch. i, p. 365, 1847. Not *Orbicula*, Cuv. (= *Discina*, Lam.)

Orbiculacea, Anton. *Lyopomata.* **1839.**

Verzeichn. p. 21. Fam. Brach. cont. *Orbicula.*

Orbiculæ, Deshayes. *Lyopomata.* **1830.**

Encyc. Méth. iii, p. 553, tabl. Fam. Brach. cont. *Orbicula.*

Orbicularius, Dumeril. *Craniidæ.* **1806.**

Zool. Analyt. p. 168. (= *Orbicula*, Cuv.)

Orbiculidæ, M'Coy. *Lyopomata.* **1844.**

Carb. Foss. Ireland, p. 103. Fam. Brach. cont. *Orbicula.* Adt. King, Ann. Mag. Nat. Hist. xviii, p. 28, 1846. (=*Discinidæ.*)

Orbiculidæ, D'Orbigny. *Lyopomata.* **1849.**

Cours Élém. Pal. p. 80. Fam. Brach. cont. *Siphonotreta, Orbicella, Orbiculoidea, Orbicula.*

Orbiculina, Agassiz. *Lyopomata.* **1847.**

Nom. Zool. Index, p. 757. = *Orbiculidæ*, M'Coy corrig. Not *Orbiculina*, Lam. gen. Rhizop.

Orbiculoidea, D'Orbigny. *Discinidæ.* **1847.**

Comptes Rendus, xxv, p. 269. No ex. cited. Ann. Sci. Nat. xiii, 1850, p. 351. No ex. cited. Prodr. Pal. Strat. 1849 (Sil.), p. 21. 1st sp. *O. Morrisii*, "D'Orb. 1847", Dav. Mon. Sil. Brach. p. 65, pl. vii, f. 10–12. Two other sp. cited as of "D'Orb. 1848". It would appear as if *O. Morrisii* must be considered as the type. Dav. 1856, pl. xiv, f. 1–3, cites *O. elliptica*, Kutorga sp. (*Schizotreta*) as type or example of both *Orbiculoidea* and *Schizotreta*, as also in 1853, p. 129, t. ix, f. 253–255. It is, however, only the type of the latter, though both may be congeneric. (Comp. *Schizotreta*, Kut.)

Orthothrix, Davidson. *Productidæ.* **1856.**

Intr. Expl. pl. xii, f. 27; lapsus = *Orthothrix*, Geinitz.

Orthambonites, Pander. *Strophomenidæ.* **1830.**

Beitr. Geogn. Russ. Reiches, p. 80, t. iii, f. 7; xxviii, f. 18, generic diagrams. 1st sp. p. 81, t. xxii, f. 1, (Sil.) *O. transversa*, Pander, l. c., which with eleven of Pander's eighteen nominal species is referred by Broun, Ind. Pal. iii, p. 852, to *Orthis calligramma*, Dalman, Ter. p. 28, t. 2, f. 2. See *Orthis.* Syn. *Schizophoria*, King. (= *Orthis*, Davidson.)

Orthidæ, Woodward. *Arthropomata.* **1852.**

Man. Rec. and Foss. Shells, p. 229. Fam. Brach. cont. genera *Orthis, Strophomena, Davidsonia, Calceola.*

Orthis, Dalman. *Strophomenidæ.* **1828.**

Kongl. Vet. Acad. Handl. f. 1827, pp. 93, 96. 1st sp. (queried by Dalm.), *O.? pecten*, Wahl. sp. Act. Upsal. viii, p. 66; Dalm. l. c. p. 110, t. 1, f. 6. 2d sp. (also queried), *O.? striatella*, Dalm. l. c. p. 111, t. 1, f. 5; 3d (not regarded as typical by Dav.), *O. zonata*, Dalm. l. c. p. 111, t. ii, f. 1 *a–e* (not = *O. adscendens*, Pander); 4th sp. *O. callactis*, Dalm. l. c. p. 112, t. ii, f. 2; 5th sp. *O. calligramma*, Dalm. l. c. p. 114, t. ii, f. 3 *a–d*; Dav. 1853, t. vii, f. 127. This and the 4th sp. are taken as typical by Davidson. Syn. *Schizophoria*, King; *Orthambonites*, Pander. Not *Orthis*, Mke.

Orthis, Menke. *Terebratulidæ.* **1830.**

Syn. Mus. Menkeanum, ed. ii, p. 96. Sole ex. *Anomia truncata*, Lin. sp. Dav. 1856, pl. vii, f. 9–12. Id. Philippi, Moll. Sicil. ii, p. 69; i, p. 95, t. vi, f. 12. Not congeneric with any of Dalman's species. (= *Megerlia*, King.)

Orthis, King. *Strophomenidæ.* **1850.**

Perm. Foss. pp. 103-105. Type *Anomites pecten*, Wahl., Dalman's 1st but queried sp. of *Orthis*. Dav. 1856, pl. xi, f. 42. Not *Orthis*, Davidson, Mke. but = *Strophomena*, Bl. sp.

Orthis, Davidson. *Strophomenidæ.* **1853.**

Intr. p. 101, pl. vii, f. 127. Types *O. calligramma*, Dalm. Dav. l. c. and *O. elegantula*, Dalm. Dav. l. c. pl. viii, f. 140. Ibid. 1856, p. 194. Includes *Orthambonites*, *Platystrophia*, *Dicaelosia*, and *Schizophoria*. (= *Orthis*, Dalm. em. not of King, Menke, or Philippi)

Orthisidæ, D'Orbigny. *Arthropomata.* **1849.**

Cours Élém. Pal. p. 80. Fam. Brach. cont. *Strophomena*, *Orthis*, *Orthisina*.

Orthisina, D'Orbigny. *Strophomenidæ.* **1847.**

Comptes Rendus, xxv, p. 267. No ex. cited. Ann. Sci. Nat. viii, p. 268, t. 8, f. 7 (probably *anomala*). No sp. named. Id. xiii, 1850, p. 319. No type specified. Three species: 1st, *O. anomala*, Schloth. sp. Dav. 1853, t. 8, f. 150, 151; 2d, *O. adscendens*, Pander sp.; 3d, *O. Verneuilii*, D'Orbigny (Eichwald sp.). Prodr. Pal. Strat. i, p. 18. No type cited. Three sp. named: 1st, *Verneuili;* 2d, *anomala;* 3d, *adscendens*. Cours Élém. Pal. 1852, ii, p. 84. Sole ex. cited, *O. Verneuilii*, l. c. f. 243. Eichwald, Urwelt, ii, p. 51, t. 2, f. 3-5. Dav. 1856, t. xi, f. 23. This should probably be taken as the type. Quenstedt considers *anomala* and *adscendens* conspecific. (= *Klitambonites*, Pand.)

Orthisina, King. *Strophomenidæ.* **1850.**

Perm. Foss. p. 105. Ex. *Gonambonites plana*, Pand. Dav. 1856, pl. xi, f. 25. Ibid. 1853, pl. viii, f. 153, 154.

Orthisina, Davidson. *Strophomenidæ.* **1853.**

Intr. p. 104, pl. viii, f. 149. Takes as type *Klitambonites adscendens*, Pander, l. c. Ibid. 1856, p. 198, pl. xi, f. 24, 26. (= *Klitambonites*, P.)

Orthonata, Emmons. *Acephala.* **1842.**

Genus supposed by Herrmannsen, Ind. Mal. ii, p. 165, to belong to the Brachiopoda. (Lapsus, = *Orthonota*, Conrad.)

Orthotetes, Oken. *Strophomenidæ.* **1831.**

Isis, p. 232, as of Fischer de Waldheim. Agassiz, Nom. Zool. Index, p. 764, 1847. King, Ann. Mag. Nat. Hist. xviii, 1846, p. 37, note, cites *Strophomena pecten*, Wahl., as the apparent type. (= *Orthothetes*, Evans.)

Orthotheles, D'Orbigny. *Strophomenidæ.* **1850.**

Pal. Franç. Terr. Cret. iv, p. 340; lapsus (= *Orthothetes*, Evans.)

Orthothetes, (Evans, MS.) Fischer. (*Incertæ sedis.*) **1829.**

Bull. Soc. Imp. Nat. Moscou, i, p. 375. No ex. cited or figured. Generic description insufficient to be recognizable. Stated to be related to *Placuna* and *Pedum*. (Gen. incert.)

Orthothetes, Fischer de Waldheim. *Strophomenidæ.* **1837.**

Oryct. Gouv. Moscou, p. 133, t. xx, f. 4 *a–c.* No specific name applied. According to Bronn, the figure represents *Orthis arachnoidea*, Verneuil, Geol. Russ. Ural Mts. ii, p. 196, t. x, f. 18; xi, f. 1, which, according to Davidson, is *Spirifera crenistria*, Phillips, Geol. Yorkshire, ii, 1836, p. 216, pl. ix, f. 6, = *Streptorhynchus crenistria*, Dav. Mon. Carb. Brach. pp. 124, 228, and Mon. Dev. Brach. p. 81. Fischer again introduces the name in Bull. l. c. 1850, p. 23, pl. x, f. 3, with the species this time named *O. radiata*, Fischer, = *Streptorhynchus umbraculum*, Dav. Mon. Dev. Brach. p. 76. Syn. *Streptorhynchus*, King. (= *Hipparionyx*, Vanuxem.)

Orthothrix, Geinitz. *Productidæ.* **1847.**

Bull. Soc. Imp. Nat. Moscou, xx, p 84. Type *Strophalosia excavata*, Geinitz, sp. Dav. 1856, pl. xii, f. 27–29. Cf. Geinitz, Zechst. p. 48, 1848, and Verneuil, Bull. Soc. Géol. France, v, p. 300, 1848. (= *Strophalosia*, King.)

Orthotoma, Quenstedt. *Terebratulidæ.* **1871.**

Petref. Deutschl. ii, p. 315, pl. 45, f. 138–142. Subg. *Terebratula.* (Mid. Lias.) Type *Ter. Heyseana*, Roemer, Verst. Nordl. Ool. 1836, p. 35, t. 12, f. 7.

Orthotrix, Auctt. *Productidæ.*

Lapsus; cf. *Orthothrix*, Geinitz.

Ostracites, Llhwyd. *Invertebrata.* **1699.**

Lith. Brit. Ichn. and other non-binomial authors. Genus incert. Included fossil Pectinides, Spondyli, Ostreæ, and Brachiopoda.

Ostreopectinites, Auctt. *Invertebrata.*

Used by early non-binomial authors to include various ribbed brachiopods, *Anomia* and *Ostrea* sp. foss.

Oxyrhynchus, Llhwyd. *Rhynchonellidæ.* **1699.**

Lith. Brit. Ichn. p. 34, non-binomial. Quenstedt, Petref. Deutschl. ii, 1871, pp. 29, 34. (= *Rhynchonella*, Fischer, not *Oxyrhynchus*, Aristotle.)

Pachiloma, Rafinesque. *Brachiopoda.* **1831.**

Mon. Biv. Shells Ohio R. p. 8. No ex. cited. Gen. incert.

Pachyloma, Herrmannsen. *Brachiopoda.* **1848.**

Ind. Gen. Mal. ii, p. 186. Paetel, Fam. u. Gatt. Moll. p. 149, 1875; lapsus, = *Pachiloma*, Raf.

Pachyrhynchus, King. *Terebratulidæ.* **1850.**

Perm. Foss. p. 70. (Recent.) Type *Terebratula rosea*, Mawe. Sow. Gen. f. 4, Dav. 1856, pl. vii, f. 25–8. (= *Bouchardia*, Dav.)

Palæocrania, Quenstedt. *Craniidæ.* **1871.**

Petref. Deutschl. ii, p. 688, t. 61, f. 98. (Sil.) Sole ex. *Orbicula antiquissima*, Eichw. Leth. Ross. 1860, i, p. 909. (Cf. *Pseudocrania*, M'Coy.)

Palliobranchiata, Blainville. *Invertebrata.* **1824.**

Dict. Sci. Nat. xxxii, p. 298. Class Moll. cont. the Brachiopoda and some genera of *Acephala.*

Palliobranchiata, King. *Brachiopodæ.* **1846.**

Ann. Mag. Nat. Hist. xviii, p. 26. Class Moll. cont. *Obolidæ, Lingulidæ, Orbiculidæ, Craniidæ, Calceolidæ, Strophomenidæ, Productidæ, Terebratulidæ, Spiriferidæ, Thecideidæ.*

Paracyclas, Hall. *Acephala.* **1843.**

Geol. Rep. Fourth Distr. N. York, p. 171. Erroneously referred by Herrmannsen, Ind. Gen. Mal. ii, p. 200, to the Brachiopoda. (Gen. *Lucinidarum.*)

Pectinites, Aldrovandus. *Invertebrata.* **1468.**

Mus. Met. &c. Contained fossil pectens, with which pectiniform brachiopods were often confounded.

Pectunculi, Lister. *Invertebrata.* **1687.**

And subsequent non-binomial authors. Contained fossil sp. of brachiopods among other things. Cf. *Pectunculites.*

Pectunculites, Lister. *Invertebrata.* **1687.**

Hist. an. Angl. p. 245. Gen. conch. biv. fos. cont. sp. of brachiopods. Non-binomial. (Cf. *Pectinites.*)

Pectunculus, Quenstedt. *Arthropomata.* **1871.**

Petref. Deutschl. ii, p. 27, gen. Hypothyridarum; p. 3 mentions *P. ferreolus*, Gesner, 1565, De fig. lapid. p. 166. Non-binomial. =? *Terebratula rimosa*, Quenst. Handb. Petref. 1851, p. 447. Not *Pectunculus*, Lam.

Pedunculata, Berth. *Brachiopoda.* **1827.**

Germ. ed. Latreille, Fam. Nat. p. 196. Order cont. fam. *Æquivalvia, Inæquivalvia.* (= *Pédoncules*, Latr.)

Pedunculata, Fleming. *Brachiopoda.* **1828.**

Brit. An. pp. 225, 367. Fam. Brach. cont. *Lingula, Terebratula, Magas, Spirifer.*

Pedoncules, Latreille. *Brachiopoda.* **1825.**

Fam. Nat. Règne An.* Ord. Brach. = *Pedunculata*, Berth.

Pentagonia, Cozzens. *Spiriferidæ.* **1846.**

Ann. Lyc. Nat. Hist. N. York, iv, p. 158, pl. x, f. 3 *a–b*; read Dec. 8th, 1845. Type *P. Peersii*, Cozzens, l. c. = *Atrypa unisulcata*, Conrad, Pal. N. Y., iv, p. 309, pl. 50. Comp. *Goniocœlia*, Hall.

Pentamerella, Hall. *Pentameridæ.* **1867.**

Notice Pal. N. York, vol. iv, March, p. 163. Pal. N. York, iv, pp. 373, 375. Type *Atrypa arata*, Conrad. An. Rep. Geol. N. York, 1841, p. 55. Hall, l. c. 1867, p. 375, pl. 58, f. 1–21.

Pentameridæ, M'Coy. *Arthropomata.* **1844.**

Carb. foss. Ireland, p. 103. Fam. Brach. cont. *Pentamerus.*

Pentameridæ, Hall. *Arthropomata.* **1867.**

Notice of Pal. N. Y, vol. iv, p. 19. Fam. brach. cont. *Pentamerus, Pentamerella, Stricklandinia, Gypidula, Anastrophia, Amphigenia, Camarophoria, ?Triplesia, ?Gypidia, ?Camarella* sp.

Pentameroidæ, Agassiz. *Arthropomata.* **1847.**

Nom. Zool. Index, p. 805, = *Pentameridæ*, M'Coy corrig.

Pentamerus, Sowerby. *Pentameridæ.* **1813.**

Min. Conch. i (Germ. ed. p. 48), pl. 28, f. 1, 1813. 1st sp. *P. Knightii*, Sowerby, l. c.; Dav. 1856, pl. x, f. 33–34. Other sp. *P. lævis*, Sow. l. c. f. 2; *P. Aylesfordi*, Sow. l. c. t. 28, f. 3; t. 29. (Cf. *Conchidium*, Lin.)

Pentastera, Herrmannsen. *Pentameridæ.* **1848.**

Index Gen. Mal. ii, p. 231, = *Pentastère*, Bl. = *Pentamerus*, Sowerby.

Pentastère, Blainville. *Pentameridæ.* **1824.**

Dict. Sci. Nat. xxxii, p. 301. Ibid. Man. Mal. 1825, p. 511. Vern. pro *Pentamerus*, Sowerby.

Perforata, Giebel. *Arthropomata.* **1852.**

Allgem. Pal. p. 78. Fam. Brach. = *Orthisidæ*, D'Orbigny.

Peridiolithus, Hupsch. *Brachiopoda.* **1768.**

Neue Entdeck. p. 144; non-binomial. †= *Orthis*, sp.

Pharetra, Bolten. *Lingulidæ.* **1798.**

Mus. Bolt., (ed. 1819, p. 111). Sole ex. *P. monoculoides*, Bolt. l. c. No description or figure of genus or species. = *Lingula anatina*, Lam. Hist. vi. 1819, p. 258. (= *Lingula*, Brug.)

Pholidops, Hall. *Craniidæ.* **1860.**

13th Regent's Rep. p. 92; 15th do. p. 195. 1st sp. *P. squamiformis*, Hall, Pal. N. York, iii, pl. 108 B, f. 6 *a–b*. In notice of Pal. N. Y. vol. iv, Mar. 1867, by a MS. correction as distributed, this genus is said to be a synonym of *Pseudocrania*, M'Coy, 1859. In Pal. N. Y. vol. iv, p. 413, *Crania antiquissima*, Eichwald, Verneuil, Geol. Rus. Ural. ii, pl. i, f. 12 *a–c*, is said to be a *Pholidops*, but was cited by M'Coy as his first of two species of *Pseudocrania*. M'Coy's *P. divaricata* is said to be of a different type. Syn. *Palæocrania*, Quenstedt, 1871. (Sil.) (= *Pseudocrania*, M'Coy.)

Pilolithus, Beuth. *Calceolidæ.* **1776.**

Juliæ et Mont. subterr. p. 150. Non-binomial. (= *Calceola*, Lam.)

Plachiloma, Ferussac. *Brachiopoda.* **1835.**

Bull. Zool. p. 23; lapsus, = *Pachiloma*, Raf.

Placunea, Rafinesque. *Invertebrata.* **1815.**

Analyse Nat. p. 148. Fam. cont. *Cranicella*, Raf. (= *Les Ostracées*, Lam.)

Platidia, Costa. *Terebratulidæ.* **1852.**

Fauna del Regno Napoli, p. 47, January. (Recent.) Type *Terebratula anomioides*, Scacchi, in Philippi, Moll. Sicil. ii, p. 69, pl. xviii, f. 9. Syn. *Morrisia*, Dav.

Platidiinæ, Dall. *Terebratulidæ.* **1870.**

Am. Journ. Conch. vi, p. 100. Subfam. cont. *Platidia*.

Platilia, Rafinesque. *Brachiopoda.* **1831.**

Mon. Biv. Shells Ohio R. p. 7. Sect. Terebrariorum cont. *Platilites, Pleurinea, Pachiloma, Strophomenes, Pleuranisis.*

Platilites, Rafinesque. *Brachiopoda.* **1831.**

Mon. Biv. Shells Ohio, p. 8. No ex. cited. Genus incert.

Platistrophia, Quenstedt. *Strophomenidæ.* **1871.**

Petref. Deutschl. ii, p. 735; lapsus, = *Platystrophia,* King.

Platystrophia, King. *Strophomenidæ.* **1850.**

Perm. Foss. p. 106. (Sil.) Type *Orthis biforata,* Schloth. Dav. 1853, p. 101, pl. vii, f. 146–148. (= *Orthis,* Dav.)

Plectambonites, Pander. *Strophomenidæ.* **1830.**

Beitr. Geognos. Russ. Reiches, p. 90, t. iii, f. 8, 16; t. xxviii, f. 19, generic figures. 1st sp. p. 90, t. xix, f. 1, *P. planissima,* Pand. l. c. Sil. (which with *P. convexa,* Pander, l. c. p. 91, t. xix, f. 5, and other of Pander's sp. is referred by Bronn, Ind. Pal. iii, p. 995, to "*Leptaena*" *convexa,* Murch. Verneuil and Keys. Geol. Russia, ii, p. 232, t. 15, f. 5). Generic figure t. iii, f. 8, appears to represent a *Strophomena* of the *rhomboidalis* type. Adt. Shaler, 1865, Bull. Mus. Comp. Zool. i, p. 64: 1st sp. *P. glabra,* Shaler, l. c. (Sil.) Syn. *Leptagonia,* M'Coy; *Leptaena,* King; *Strophomena,* sp. Dav.; *Leptaena,* sp. Dalman.

Pleuranisis, Rafinesque. *Brachiopoda.* **1831.**

Mon. Biv. Shells Ohio, p. 8. No ex. cited. Genus incert.

Pleurecterites, Bronn. (*Incertæ sedis.*) **? 1848.**

Pal. Coll. p. 118. Herrmannsen, Ind. Gen. Mal. ii, p. 391. = *Pleureterites,* Raf. corrig. Cf. *Pleureterites.*

Pleureterites, Rafinesque. *Invertebrata.* **1832.**

Atlantic Journal, iv, p. 142, cuts.: 1st sp. *P. lateristria,* Raf. f. 2 (apparently a fossil coral); 2d sp. *P. obliqua,* Raf. f. 3, p. 143 (= *Trigonia,* sp.). Genus worthless; referred by Agassiz, Nom. Zool. Index, p. 860, 1847, to the Brachiopoda.

Pleurinea, Rafinesque. *Brachiopoda.* **1820.**

Ann. Gen. Sci. Phys. Bruxelles, v, p. 232; name cited; no description. Mon. Biv. Sh. Ohio, p. 8; diagn.; no ex. cited. Genus incert.

Pleuropygia, Bronn. *Brachiopoda.* **1862.**

Klass. u. Ordn. Thierr. iii, 1 Ste Abth. p. 301. Order cont. the inarticulated brachiopods. (= *Lyopomata,* Owen.)

Poleteria, Rafinesque. *Invertebrata.* **1815.**

Analyse Nat. p. 148. Order cont. among other things the family *Brachiopea.*

Polymaria, "Deshayes", King. *Invertebrata.* **1850.**

Perm. Foss. p. 67, in synonymy. ? lapsus pro *Polymyaria.* (= *Brachiopoda,* Cuv.)

Porambonites, Pander. *Porambonitidæ.* **1830.**

Beitr. Geogn. Russ. Reiches, p. 95, t. iii, f. 9: generic figure; t. xxviii, f. 21, 25; 1st sp. p. 95, t. xvi A, f. 12, (Sil.) *P. intermedia*, Pander, l. c. Eight of Pander's species are referred by Bronn, Ind. Pal. iii, p. 1029, to *P. æquirostris*, Schlotheim sp. = *Terebratulites æquirostris*, Schloth. Petref. i, p. 282, 1820, which is taken as type by Dav. 1853, p. 99, t. vii, f. 120–122, and 1856, p. 192, pl. x, f. 37–39. Cf. Dav. Geol. Mag. Decade ii, vol. i, Feb. 1874, t. iii. Syn. *Isorhynchus*, King; *Priambonites*, Agassiz.

Porambonitidæ, Davidson. *Arthropomata.* **1853.**

Intr. p. 51. Fam. Brach. cont. *Porambonites.* Ibid. 1856 (olim).

Priambonites, Agassiz. *Strophomenidæ.* **1847.**

Nom. Zool. Fasc. ix, 1846. Index, p. 886, 1847. Idem. Herrmannsen, Ind. Gen. Mal. ii, p. 331, and Paetel, Fam. u. Gatt. Moll. p. 471; lapsus, = *Porambonites*, Pander.

Prionites, Agassiz. *Strophomenidæ.* **1847.**

Nom. Zool. Index, p. 888. Idem. Herrm. l. c. ii, p. 332, 1848; lapsus, = *Pronites*, Pander, not Illiger.

Producta, G. B. Sowerby. *Productidæ.* **1825.**

Genera of Shells, fasc. 21. (= *Productus*, Sow.)

Producta, M'Coy. *Productidæ.* **1844.**

Carb. Foss. Ireland, p. 105, f. 9. First sp. *Productus aculeatus*, Sow. Min. Conch. t. 68, f. 7–8, 1813.

Productella, Hall, *Productidæ.* **1867.**

Notice of Pal. N. York, vol. iv, Mar. p. 149. Pal. N. York, iv, p. 153. First sp. *P. subaculeatus*, Murch. Bull. Soc. Géol. France, xi, p. 255, pl. ii, f. 9 *a–c*, 1840. Hall, l. c. p. 154, pl. xxiii.

Producti, Deshayes. *Arthropomata.* **1830.**

Encycl. Méth. iii, p. 553, tabl. Fam. Brach. cont. *Productus.* (= *Productidæ*, Dav.)

Productidæ, Gray. *Invertebrata.* **1840.**

Synops. Brit. Mus. i, p. 155. Fam. Brach. cont. *Productus, Calceola.*

Productidæ, King. *Arthropomata.* **1846.**

Ann. Mag. Nat. Hist. xviii, p. 28. Fam. Brach. cont. *Productus, Strophalosia.*

Productidæ, D'Orbigny. *Arthropomata.* **1847.**

Comptes Rendus, xxv, p. 267. Fam. Brach. cont. *Productus, Chonetes, Leptagonia, Leptæna.*

Productidæ, Gray. *Invertebrata.* **1848.**

Ann. Mag. Nat. Hist. ii, p. 438. Fam. Brach. cont. *Productus, Strophalosia, Chonetes, Leptaena, Orthis, Strophonema, Calceola.*

Productidæ, D'Orbigny. *Arthropomata.* **1849.**

Cours Élém. Pal. p. 80. Fam. Brach. cont. *Productus, Chonetes, Leptæna.*

Productidæ, Davidson. *Arthropomata.* **1853.**

Intr. p. 51. Fam. brach. cont. *Chonetes, Strophalosia, Productus,* (*Aulosteges?*). Ibid. 1856, p. 90.

Productidæ, Quenstedt. *Arthropomata.* **1871.**

Petref. Deutschl. ii, p. 27. *Mesopygia,* sect. iii, cont. subsect. *Diplothyridæ, Syphnothyridæ.*

Productina, Giebel. *Arthropomata.* **1846.**

Allgem. Pal.* Fam. Brach. = *Productidæ,* D'Orbigny. Ibid. Agassiz, Nom. Zool. Index, p. 892, 1847.

Productus, Sowerby. *Productidæ.* **1812. / 1814.**

Min. Conch. i, p. 153, t. 68; do. iv, p. 15, t. 317, f. 2–4, 1823. Type *P. martini,* Sow. l. c. = *Anomites semireticulatus,* Mart. 1809, Petref. Derb. p. 7, pl. xxxii, f. 1–2, + *A. productus,* Mart. l. c. p. 9, pl. xxii, f. 1–3. Adt. Dav. 1856, *P. martini,* Sow. pl. xii, f. 11; Koninck, Mon. *Productus,* 1847, p. 83, pl. viii, f. 1 *a–h*; pl. ix, f. 1 *a–m*; pl. x, f. 1 *a–d.*

Pronites, Pander. *Strophomenidæ.* **1830.**

Beitr. Geogn. Rus. Reich. p. 71, sect. *Klitambonites;* 1st sp. *P. adscendens,* Pander, l. c. t. xvii, f. 6. (Sil.) Dav. 1856, pl. xi, f. 24, 26, = type of *Klitambonites.* Not *Pronites,* Illiger, 1811, gen. Avium. (= *Klitambonites,* Pand.)

Protonia, Link. *Productidæ.* **1830.**

Handb. Phys. Erdbeschr. ii. 1, p. 449. (= *Productus,* Sow. corrig.) Quenstedt, Petref. Deutschl. ii, 1871, pp. 27, 609; no ex. cited. Not *Protonia,* Rafinesque.

Pseudocrania, M'Coy. *Craniidæ.* **1851.**

Ann. Mag. Nat. Hist. viii, p. 388. Type *Crania antiquissima,* Eichwald, Sil. Schicht. Esthl. 1840, p. 169. Dav. 1856, pl. xiii, f. 22. Cf. Dav. Mon. Sil. Brach. p. 79. M'Coy's 2d sp. *Crania divaricata,* M'Coy, Dav. Mon. Sil. Brach. l. c. pl. viii, f. 7–12. Dav. 1856, pl. xiii, f. 25–26. Syn. ? *Pholidops,* Hall; *Palæocrania,* Quenstedt.

Pugites, De Haan. *Terebratulidæ.* **1833.**

Mus. Lugdun. p. —. Type *Terebratula diphya,* Col. Woodw. Man. p. 215, pl. xv, f. 2, 1854. Bronn, Leth. p. 653, 1838, (fide Herrm., Bronn.) (= *Pygope,* Link.)

Pycnodonte, Fischer de Waldheim. *Invertebrata.* **1835.**

Bull. Soc. Imp. Nat. Mosc. viii, pl. i; gen. cont. *Orthis,* sp. et *Gryphæa,* sp. foss.

Pygope, Link. *Terebratulidæ.* **1830.**

Handb. Phys. Erdbeschr. ii, 1, p. 451. Type *Terebratula diphya,* Col., von Buch, Ueber Ter. p. 88, t. i, f. 12. King, Perm. Foss. 1850, p. 144. Woodward, Man. p. 215, pl. xv, f. 2. Syn. *Pugites,* De Haan; *Antinomia,* Catullo.

Pyxis, Chemnitz. *Productidæ.* **1784.**

Conchyl. Cab. vii, p. 301, non-binomial; = *Productus pustulosus,* Phillips, Geol. Yorkshire, ii, p. 216, pl. vii, f. 15. Not *Pyxis,* Humphrey, Bell, or Dej.

Rensselæria, Hall. *Terebratulidæ.* **1859.**

12th Regent's Rep. p. 39, Oct. 1st sp. *R. suessana*, Hall, l. c. f. 12. = *Meganteris s.* Hall, 10th Reg. Rep. 1857, p. 100; Pal. N. York, vol. iii, pl. 106 *a*, f. 1. 2d sp. *Terebratula ovoides*, Eaton, Geol. Textb. p. 45, 1832; not of Sow. Hall, Pal. N. York, iii, pl. 104-5, f. 1. 12th Reg. Rep. l. c. f. 3, 4, 5. Dall, Rev. Ter. 1870, p. 105, took the second sp. as the type. (Comp. *Centronella*, Bill.)

Reticularia, M'Coy. *Spiriferidæ.* **1844.**

Carb. Foss. Ireland, p. 142, f. 26, pl. xix, f. 15. 1st sp. *Terebratula ? imbricata*, Sow. Min. Conch. t. 334, f. 4-6, 1823 (Germ. ed. p. 365). (? = *Spirifer*, Sow.)

Retsia, Davidson. *Spiriferidæ.* **1856.**

Intr. pl. ix; lapsus, = *Retzia*, King.

Retzia, King. *Spiriferidæ.* **1850.**

Mon. Perm. Fos. p. 137. Type *Terebratula adrieni*, Vern. Hall, 16th Reg. Rep. p. 57, f. 4; Dav. 1856, pl. ix, f. 31. Comp. *Acambona*, White; *Eumetria*, Hall.

Rhizophyllum, Lindström. *Calceolidæ.* **1866.**

Ofvers. K. Vet. Akad. Forh. 1865, p. 271, pl. xxxi, f. 1-8. Type *R. gotlandicum*, Lindstr. l. c. = *Calceola gotl.* F. Roemer. (= *Calceola*, Lam.)

Rhynchonella, Fischer de Waldheim. *Rhynchonellidæ.* **1809.**

Notice des Fos. Gouv. Moscou, Oct. 26, 1809, p. 35, t. ii, f. 5, 6. Type *R. loxia*, Fischer, l. c. Dav. 1853, pl. vii, f. 99. Ib. 1856, pl. x, f. 7. Cf. *Hemithiris*, D'Orb.; *Hypothyris*, Phillips; *Rhynchotrema*, Hall. (= *Rhynchonella*, Bl.)

I have been able to consult the original paper.

Rhynchonella, (Fischer) Blainville. *Rhynchonellidæ.* **1827.**

Blainville, Dict. Sci. Nat. xlv, p. 426, 1827. Fischer de Waldheim, Oryct. Gouv. Mosc. 1837, pl. 24. Type *R. loxia*, Fischer, Dav. 1853, pl. vii, f. 99. Resembles *R. acuta*, Sow. Lias (Dav. in litt.). Cf. *Hypothyris*, Phillips; *Rhynchotrema*, Hall.

Rhynchonellidæ, D'Orbigny. *Arthropomata.* **1849.**

Cours Élém. Pal. p. 80. Fam. Brach. cont. *Hemithiris, Rhynchonella, Strigocephalus, Porambonites.*

Rhynchonellidæ, Gray. *Arthropomata.* **1848.**

Ann. Mag. Nat. Hist. ii, p. 438. Fam. Brach. cont. *Rhynchonella, Camerophoria, Uncites ?, Trigonosemus, Rhyncora* (Dalm.), *Pygope, Delthiridæa, Pentamerus.*

Rhynchonellidæ, Davidson. *Arthropomata.* **1853.**

Intr. p. 51. Fam. Brach. cont. *Rhynchonella, Camarophoria, Pentamerus.* Ibid. 1856, p. 90.

Rhynchonellina, Gemellaro. *Rhynchonellidæ.* **1871.**

Giorn. Sci. Nat. ed Econ. Palermo, Studj. Pal. sulla Fauna del Calcari a *Ter. janitor*, iii, p. 29. Type *R. Suessi*, Gem. p. 31, l. c. pl. v, f. 1-7. (Jura.)

(This paper not seen, but particulars kindly furnished by Mr. Davidson.)

ynchopora, King. *Rhynch*

Ann. Mag. Nat. Hist. 2d ser. xvii, p. 506, pl. 12, f. 11. Type *Rhynchonella Geinitziana*, Verneuil, King, l. c. Not *Rhynchopora*, Illiger, gen. crustaceorum, nor of Latr. gen. coleopterarum.

hynchora, Dalman. *Terebratulidæ.* **1828.**

Kongl. Vet. Acad. Handl. f. 1827, pp. 105, 135. 1st sp. *Terebr. costatus*, Dalm. l. c. = *Anomites costatus*, Wahl. 1821, Act. Upsal. viii, p. 62, t. iv, fig. 12–14. Supposed by Dalman to = *T. lyra*, Sow. = *Lyra Meadii*, Cumberland. 2d sp. p. 136, *Anomites spathulathus*, Wahl. l. c. t. iv, f. 10, 11, 1821. Dav. 1856, p. 126, pl. vii, f. 19–21, pl. xiv, f. 54, 55. (Cret). Herrmannsen, Index Gen. Mal. Suppl. takes 2d sp. as type. King, Perm. Fos. p. 81, takes the 1st.

Davidson says that Hagenow added a false beak to some of his specimens of *T. costata*, which seems to be a *Trigonosemus*. Woodward mentions the same thing, and adds that a cast of this false beak is in the British Museum. Dalman quotes *T. lyra*, Sow., in his synonymy of *T. costata*, but places a note of interrogation after the "rostrum . . . . producta?" in his diagnosis. The name would seem to be well retained as a subgenus of *Magas*, with the second species as the type.

Rhynchoridæ, King. *Arthropomata.* **1850.**

Perm. Fos. p. 81 (p. 245, olim). Fam. Brach. cont. *Ismenia*, *Delthyridæa*, *Rhynchora*.

Rhynchospira, Hall. *Spiriferidæ.* **1859.**

12th Regent's Rep. Oct. pp. 28, 29, f. 1–6. Type *R. formosa*, Hall, l. c. Pal. N. York, iii, p. 484, pl. xcv, *a*, f. 7–11, same type, 1859. (Comp. *Retzia*, King.)

Rhynchotrema, Hall. *Rhynchonellidæ.* **1860.**

13th Regent's Rep. App. F. p. 68. Type *Rhynchonella increbescens*, Hall, l. c. p. 66, f. 8–13. (L. Sil.) = *Atrypa incr.* Hall, Pal. N. York, 1847, vol. i, pp. 146, 289, pl. 33, f. 13 *a-y*, pl. 79, f. 6, = *A. capax*, Conrad, Journ. Phil. Acad. Nat. Sci. viii, p. 264, 1842. (Comp. *Rhynchonella*, F.)

Rhynchura, Agassiz. *Terebratulidæ.* **1847.**

Nom. Zool. Index, p. 942, = *Rhynchora*, Dalm. corrig.

Rhyncora, Gray. *Terebratulidæ.* **1848.**

Ann. Mag. Nat. Hist. ii, p. 438; lapsus, = *Rhynchora*, Dalm.

Rhyncospira, Hall. *Spiriferidæ.* **1859.**

Pal. N. York, iii, 1859, p. 213, subg. *Trematospira*. (L. Held.) 1st sp. *Trematospira globosa*, Hall, l. c. p. 215, pl. 36, f. 1 *a-p*. Lapsus, = *Rhynchospira*.

Rhyngonella, Bronn. *Rhynchonellidæ.* **1849.**

Nom. Pal. iii, p. 1087, lapsus, = *Rynchonella*, Fischer.

Rhynobolus, Hall. *Trimerellidæ.* **1871.**

23d Regent's Rep. p. 247, pl. 13, f. 10, 1872. Extras Mar. 1871, fide Hall. Type *Obolus galtensis*, Bill. Hall, l. c. (= *Trimerella*, Bill.)

Sacculus, Llhwyd. *Brachiopoda.* **1699.**

Lith. Brit. Ichn. p. 42, no. 871; non-binomial. Gen. incert.

Sandaliolite, Rozier. *Calceolidæ.* **1774.**

Journ. de Phys. iii, p. 150; non-binomial. (= *Calceola*, Lam.)

Sandaliolithus, Hupsch. *Calceolidæ.* **1768.**

Neue Entdeck. p. 56; non-binomial. (= *Calceola*, Lam.)

Sandalite, Rozier. *Calceolidæ.* **1774.**

Journ. de Phys. iii, p. 150; non-binomial. (= *Calceola*, Lam.)

Sandalites, Hupsch. *Calceolidæ.* **1768.**

Neue Entdeck. p. 56; non-binomial. (= *Calceola*, Lam.)

Sandalium, Oken. *Calceolidæ.* **1815.**

Lehrb. der Naturges. iii, p. vii. (= *Sandalites*, Hupsch. corrig.)

Sarcicobrachia, Gray. *Brachiopoda.* **1848.**

Ann. Mag. Nat. Hist. ii, p. 436. Ord. Brach. cont. *Productidæ, Craniadæ, Discinidæ, Lingulidæ.*

Sarcicobrachia, King. *Brachiopoda.* **1850.**

Perm. Foss. p. 81. Ord. Brach. cont. *Lingulidæ, Obolidæ, Craniadæ, Discinidæ, Calceolidæ, Davidsonidæ, Productidæ, Strophomenidæ.*

Sarcicobranchia, Paetel. *Brachiopoda.* **1875.**

Fam. n. Gatt. Moll. p. 185; lapsus, = *Sarcicobrachia*, Gray.

Schizocrania, Hall and Whitfield. *Discinidæ.* **1875.**

Pal. Ohio, ii, p. 71, pl. i, f. 12–15. (Cincin. Gr.) Type *Orbicula filosa*, Hall, Pal. N. York i, p. 99, pl. xxx, f. 9. = *Trematis f.* Hall, 23d Reg. Rep. expl. pl. xiii, f. 21–22.

Schizophoria, King. *Strophomenidæ.* **1850.**

Perm. Fos. p. 106. Type *S. resupinatus*, King, = *Conch. an. resupinatus*, Martin, Petref. Derb. 1809, p. 12, t. 49, f. 13–14, = *Orthis res.*, Phillips, Pal. fos. Cornwall and Devon. p. 67, t. 27, f. 15, and Murch. Vern. Keys. Geol. Rus. Ural, ii, 183, t. 12, f. 5, 6. (= *Orthis*, Dalm.)

Schizotreta, Kutorga. *Discinidæ.* **1848.**

Verh. K. Min. Ges. St. Petersburg f. 1847, pp. 260, 272, t. vii, f. *a–c.* Type *S. elliptica*, Kut. l. c. (Sil.) Dav. 1856, pl. xiv, f. 1–3. (= *Orbiculoidea*, D'Orb.)

Sclerobrachia, Gray. *Brachiopoda.* **1848.**

Ann. Mag. Nat. Hist. ii, p. 436. Ord. Brach. cont. *Spiriferidæ, Rhynchonellidæ.*

Sclerobrachia, King. *Brachiopoda.* **1850.**

Perm. Foss. p. 81. Ord. Brach. cont. *Hypothyridæ, Spiriferidæ.*

Schmidtia, Volborth. *Obolidæ.* **1869.**

Verh. K. Min. Ges. St. Petersburg, iv, 1868, p. 208, t. 17, f. 1–6. Sole ex. *S. celata*, Volb. l. c. (Sil.) p. 209. Quenst. Petref. Deutschl. 1871, p. 671. ? Syn. *Dicellomus*, Hall. Not *Schmidtia* of Bals.-Criv. gen. *Poriferæ*, 1863.

Semibrachidés, D'Orbigny. *Brachiopoda.* **1849.**

Cours Élém. Pal. p. 80. Sect. *Brachidæ* cont. *Spiriferidæ, Magasidæ, Terebratulidæ, Orbiculidæ, Cranidæ.*

Semiluna, King. *Arthropomata.* **1846.**

Ann. Mag. Nat. Hist. xviii, pp. 33, 36; lapsus, = *Seminula*, M'Coy.

Seminula, M'Coy. *Arthropomata.* **184[illegible].**

Carb. Foss. Ireland, p. 158; p. 150, f. 31. 1st sp. *Terebratula pentaëdra*, Phillips, Geol. Yorkshire, p. 221, t. 12, f. 3, 1836, = *Athyris ambigua*, Sow. fide Davidson; 2d sp. *T. seminula*, Phil. l. c. p. 222, t. 12, f. 21–23; 3d sp. *T. rhomboidea*, Phil. l. c. p. 222, t. 12, f. 18–20. (Nos. 2 and 3 are probably *Rhynchonellæ*.) M'Coy's first or typical species being a true *Athyris*, the name *Seminula* should take precedence of *Spirigera*, D'Orb, if *Athyris* be dropped.

Seminula, M'Coy. *Terebratulidæ.* **185[illegible].**

Pal. Foss. Cambridge Mus. p. 408. (Not seen by me. Stated to have been proposed this time for the group of *Terebratulæ* already characterized by King as *Epithyris* and afterward as *Dielasma*.) Not *Seminula*, M'Coy, 1844. (= *Epithyris*, King, not Phil.)

Sessiles, Latreille. *Brachiopoda.* **182[illegible].**

Fam. Nat. Règne An. p. —. Ord. cont. fam. *Fixivalves*, Latr.

Sessilia, Berth. *Brachiopoda.* **182[illegible].**

Germ. ed. Latreille, Fam. Nat. p. 196. Ord. cont. fam. *Fixivalvia.* (= *Sessiles*, Latr.)

Sessilia, Fleming. *Lyopomata.* **182[illegible].**

Brit. An. pp. 225, 367. Fam. Brach. cont. *Discina, Criopus.*

Shizotreta, Davidson. *Discinidæ.* **185[illegible].**

Intr. p. 232 in syn. lapsus; = *Schizotreta*, Kutorga.

Siphonotrema, Dana. *Lyopomata.* **184[illegible].**

Geol. U. S. Expl. Exp. p. 615; lapsus, = *Siphonotreta*, Vern.

Siphonotreta, Verneuil. *Siphonotretidæ.* **184[illegible].**

Murch. Vern. u. Keyserl. Geol. Rus. Ural, ii, p. 286. Type *Crania unguiculata*, Eichwald, Dav. 1856, p. 239, pl. xiv, f. 9–18. Kutorga, Verh. K. Min. Ges. St. Petersburg, f. 1847, p. 261. Same type (Sil.) p. 264, t. vi, f. 4–6, 1848.

Siphonotretææ, Kutorga. *Lyopomata.* **184[illegible].**

Verh. K. Min. Ges. St. Petersburg f. 1847, p. 250. Fam. Brach. cont. *Siphonotreta, Schizotreta, Acrotreta, Aulonotreta, Mesotreta.*

Siphonotreteæ, Morris. *Lyopomata.* **1847.**

Ann. Mag. Nat. Hist. iv, p. 315. = *Siphonotretææ*, Kut.

enidium, Hall. *Spiriferidæ?.* **1860.**

13th Regent's Rep. p. 70, Dec. f. 2, 4, 5. Type *Orthis insignis*, Hall, l. c. (Comp. *Rhynchora spathulata*, Dalm.) Relations doubtful, perhaps Strophomenoid.

inifer, Rafinesque. *Spiriferidæ.* **1831.**

Mon. Biv. Shells Ohio, p. 7. No ex. cited; lapsus, = *Spirifer*, Sow.

irifer, Sowerby. *Spiriferidæ.* **1815.**

Min. Conch. ii, p. 42, t 120. Sole ex. *S. cuspidatus*, Sow. l. c. (Carb.) = *Anomites cuspidatus*, Martin, Trans. Lin. Soc. iv, p. 45, t. 3, and t. 4, f. 5. Dav. Mon. Carb. Brach. pp. 44, 224.

This is the first printed reference to the genus, and it has been urged with much force by eminent authorities that the sole species mentioned here must necessarily be taken as the type of the genus. But Sowerby had previously presented a paper (in 1814), which was then read before the Linnean Society, and the substance of which became known not only in England but on the continent (cf. Dav. 1853, p. 81). This was published in the Linnean Transactions, xii, pp. 514–515, 1821, and in it the discovery of the spires from which the genus takes its name, in the *Anomites striatus*, Martin (Petref. Derb. t. 23, 1809), Sow. l. c. p. 515, t. 28, f. 1–2, was announced, while at the same time Sowerby notes that their presence in *S. cuspidatus* was only surmised at that time. On these grounds, the majority of modern authors have justifiably regarded *S. striatus* as the type (see Dav. 1856, p. 159, pl. viii, f. 22–23). This decision is of more importance, since *S. cuspidatus* belongs to a section of the genus differing in some details from that typified by *S. striatus*, and which has been recognized under the name *Syringothyris* applied by Winchell. If the work of restriction were to be done over again from the very beginning, it is probable that most authors would consider the rules of nomenclature better served by taking *cuspidatus* as the type, but the reverse process has been the rule among authors so long that it would be a serious detriment to science to attempt such a change at present.

Syn. *Spirifera*, Phillips, J. de C. Sowerby; *Trigonotreta*, König, &c. Comp. *Spirifer*, King, Meek, &c.

irifer, Meek and Hayden. *Spiriferidæ.* **1864.**

Pal. Upper Missouri (Carb.), p. 19. Mr. Meek, considering *S. cuspidatus*, Sow., the first species published under the name of *Spirifer* as the true type, defines the genus upon that basis. Cf. *Spirifer*, Sow.; *Cyrtia*, Dalman; *Trigonotreta*, König; *Syringothyris*, Winchell.

Spirifera, J. de C. Sowerby. *Spiriferidæ.* **1835.**

Index Sow. Min. Conch. 1835; Phillips, Geol. Yorksh. ii, and Dav. 1856, p. 157. (= *Spirifer*, Sow.)

Spirifera, M'Coy. *Spiriferidæ.* **1844.**

Carb. Fos. Ireland, p. 128, f. 17. 1st sp. *Terebratula aperturata*, Schloth. Petref. i, 258, ii, p. 67, t. xvii, f. 1.

Spiriferidæ, King. *Arthropomata.* **1846.**

Ann. Mag. Nat. Hist. xviii, p. 28. Fam. Brach. cont. *Spirifer, Atrypa, Martinia, Strigocephalus.*

Spiriferidæ, Gray. *Arthropomata.* **1848.**

Ann. Mag. Nat. Hist. ii, p. 437. Fam. Brach. cont. *Spirifer, Strigocephalus.*

Spiriferidæ, D'Orbigny. *Arthropomata.* **1849.**

Cours Élém. Pal. p. 80. Fam. Brach. cont. *Cyrtia, Spirifer, Spiriferina, Spirigerina, Spirigera.*

Spiriferidæ, King. *Arthropomata.* **1850.**

Perm. Foss. p. 81. Fam. Brach. cont. *Atrypa, Athyris, Cleiothyris, Retzia, Delthyris, Trigonotreta, Spirifer, Martinia.*

Spiriferidæ, Davidson. *Arthropomata.* **1853.**

Intr. p. 51. Fam. Brach. cont. *Spirifer, Athyris, Spirigera, Uncites, Atrypa*, and subg. *Spiriferina, Cyrtia, Retzia.*

Spiriferidæ, Davidson. *Arthropomata.* **1856.**

Intr. p. 90. Fam. Brach. cont. *Spirifera*, with subg. *Spiriferina, Cyrtia, Suessia; Athyris*, with subg. *Merista, Retzia, Uncites; Atrypa; ? Koninckina.*

Spiriferina, D'Orbigny. *Spiriferidæ.* **1847.**

Comptes Rendus, xxv, p. 268. No ex. cited. Id. D'Orb. Ann. Sci. Nat. xiii, 1850, p. 334. Type *Spirifer Walcotti*, Sow. = *S. rostrata*, Schloth. sp. fide Dav. 1856, p. 161, pl. ix, f. 1–5, 11, 14.

Spiriferus, Blainville. *Spiriferidæ.* **1827.**

Dict. Sci. Nat. t. 50, p. 291. = *Spirifer*, Sow.

Spirigera, D'Orbigny. *Spiriferidæ.* **1847.**

Comptes Rendus, xxv, p. 268. No ex. cited. Pal. Franç. Ter. Cret. iv, p. 357; Ann. Sci. Nat. xiii, 1850, p. 337, sole ex. and type *S. concentrica*, von Buch; Chenu, Man. ii, p. 216, f. 1108–10; Dav. 1853, p. 87, pl. vi, f. 65–67; Billings, 1867, Ann. Mag. Nat. Hist. xx, p. 233. (= *Athyris*, M'Coy.)

Proposed to replace *Athyris* with the same type, on account of discrepancies between the diagnosis and name of *Athyris* and the real characters; but, if that be rejected, *Seminula* would antedate this name.

Spirigerina, D'Orbigny. *Atrypidæ.* **184[illegible]7.**

Comptes Rendus, xxv, p. 268. No ex. cited. Ann. Sci. Nat. xiii, 1850, p. 334. Type *Anomites reticularis*, Linné, Dav. 1856, p. 175, pl. ix, f. 39–46. (= *Atrypa*, Dalman.)

Spirobranchiophora, Gray. *Invertebrata.* **1821.**

London Med. Repository, p. 238. Tribe Moll. aceph. = *Brachiopoda*, Cuv.

Spondylobolus, M'Coy. *? Obolidæ.* **1852.**

Ann. Mag. Nat. Hist. viii, p. 407. Types *S. craniolaris*, M'Coy, Dav. 1856, pl. xiii, f. 37 (Sil.), and *Crania Sedgwicki*, Lewis. The latter appears not to be a brachiopod. Cf. Dav. Mon. Sil. Brach. p. 83, pl. viii, f. 25.

Spondylobus, Davidson. *? Obolidæ.* **1853.**

Intr. p. 122, in syn. Dall, Am. Journ. Conch. vi, pp. 100, 163–5; lapsus, = *Spondylobolus*, M'Coy.

Stenocisma, Conrad. *Pentameridæ.* **1839.**

Ann. Rep. Geol. N. York, p. 59. Sole ex. *Terebratula schlotheimi*, von Buch; Chenu, Man. ii, p. 220, f. 1132 (Sil.), scr. *Stenoschisma*. Syn. *Camerophoria*, King. Not *Stenocisma*, Hall, 1847, nor 1859.

Conrad's diagnosis is very short but explicit, and agrees perfectly with the characters of the species he cites as type, but which he does not figure. His typical specimens are not preserved. Professor Hall, on the ground that Conrad had abandoned his genus, proposed, in 1847, to apply the *Stenocisma* to a group of *Atrypidæ* typified by *A. modesta*, Say. In July, 1862, however, Professor Hall, having investigated the interior of this species, proposed for it the name *Zygospira*. This was in conformity with the well-established rule that a genus once described passes out of the control of its describer, and, except for identity of characters with some other, cannot be wilfully remanded to oblivion.

In 1859, Professor Hall (Pal. N. Y. iii, 236, t. xxxv, f. 6 *a–y*) described a brachiopod from the Lower Helderberg under the name of *Rhynchonella formosa*. In 1867–68 (Pal. N. Y. iv, p. 334, and 20th Reg. Rep. p. 270), Professor Hall refers to an unpublished lithograph, with MS. notes upon it, by Mr. Conrad, among which a figure (referred by Professor Hall to his *Rhynchonella formosa*) is stated to be named *Ter. schlotheimi* in Mr. Conrad's handwriting. For that reason, Professor Hall, considering *R. formosa* to represent a particular group of *Rhynchonellidæ*, proposes to revive Conrad's name of *Stenocisma* for the group in question. In spite of some reasons which seem to recommend this course, it still remains very doubtful whether it is desirable to be adopted.

Mr. Conrad may have confounded the *R. formosa* with *T.*

schlotheimi at the time of preparing this plate, as the two shells are not dissimilar externally. Or he may have intended to represent *T. schlotheimi*, and failed to do so sufficiently to allow his figure to be distinguished from *R. formosa*. Any one familiar with Mr. Conrad's plates will not doubt the possibility of this. But there does not appear to be any certain method of deciding that there was any necessary connection between this figure and the "common Silurian bivalve" which Mr. Conrad had in his mind when he proposed his genus, and with which his diagnosis agrees. The fact that the same species was afterward made the type of the genus *Camerophoria* by Professor King has no bearing on the question.

To the writer there seems no escape from the necessity of taking Mr. Conrad's citation as it stands, and thus conforming to the rules of nomenclature, although in so doing we shall be obliged to reduce to the rank of a synonyme a name which has been widely recognized and generally adopted.

Stenocisma, Hall. *Atrypidæ.* **1847.**

Pal. N. York, i, p. 142, pl. 33, f. 15. Type *Atrypa modesta*, Say; Hall l. c. (Trenton Gr.). Scr. *Stenoschisma;* not *Stenocisma*, Conrad, 1839, nor Hall, 1867. (= *Zygospira*, Hall.)

Stenocisma, Hall. *Rhynchonellidæ.* **1867.**

Pal. N. York, iv, p. 334. Type *Rhynchonella formosa*, Hall, Pal. N. Y. iii, p. 236, pl. 35, f. 6 *a-y* (L. Held.). Scr. *Stenoschisma*, not *Stenocisma*, Hall, 1847. (Comp. *Rhynchonella*, Fisch.)

Stola, Klein. *Invertebrata.* **1753.**

Ostracol. p. 173, non-binomial, pl. xii, f. 82–86. Gen. cont. *Chama* sp. *Brachiopoda* sp. Name cited *Spondyli Listeriana*, Klein, l. c. incl. several things.

Stophalosia, Bronn. *Productidæ.* **1848.**

Leonh. u. Bronn, Jahrb. f. Min. p. 248; lapsus, = *Strophalosia*, King.

Strepheodonta, Marschall. *Strophomenidæ.* **1873.**

Nom. Zoöl. p. 140; lapsus, = *Strophodonta*, Hall.

Streptorhynchus, King. *Strophomenidæ.* **1850.**

Mon. Perm. Foss. p. 107 (Carb. and Perm.). Type *Terebratulites pelargonatus*, Schloth. Denkschr. Acad. München. vi, t. 8, f. 21–23. Dav. 1856, pl. xi, f. 27. Dav. Mon. Perm. Brach. ii, f. 38, 40–42. (See *Hemipronites*, P.)

Stricklandia, Billings. *Pentameridæ.* **1859.**

Canadian Naturalist, iv, April, p. 132, f. 8–10. (Sil.) 1st sp. *Atrypa lens* (Sow. †), Bill. l. c. Murch. Sil. Syst. pl. 8, f. 9, 10.

Billings, Can. Nat. 1863, pp. 78–85, refers species to the genus which are probably not congeneric. Cf. Hall, Pal. N. York, vol. iv, p. 373, 1867; *S. canadensis* is the first of a series of characteristic forms referred to the revised genus by Hall. Not *Stricklandia*, gen. plantarum. Cf. *Stricklandinia*.

Stricklandinia, Billings. *Pentameridæ.* **1863.**

Can. Nat. viii, 1863, p. 370. (Sil.) Proposed for *Stricklandia*, Bill., which had previously been used in botany, though this, under the prevailing practice of naturalists, was quite unnecessary. (= *Stricklandia*, Bill.)

Strigocephalidæ, King. *Arthropomata.* **1850.**

Perm. Foss. p. 81. Fam. Brach. cont. *Strigocephalus*.

Strigocephalus, Defrance. *? Terebratulidæ.* **1827.**

Dict. Sci. Nat. vol. li, p. 102, pl. 75, f. 1, 1 *a*. Type *S. Burtini*, Defrance, l. c. Woodward, Man. p. 222, f. 130, 131, pl. xv, f. 13. Scr. *Stringocephalus*, q. v.

Stringocephalidæ, Davidson. *Arthropomata.* **1853.**

Intr. p. 51, (†) fam. Brach. cont. *Stringocephalus*.

Stringocephalinæ, Dall. *Terebratulidæ.* **1870.**

Am. Journ. Conch. vi, p. 99. Subfam. Brach. cont. *Stringocephalus*.

Stringocephalus, Sandberger. *Terebratulidæ.* **1842.**

Leonh. u. Bronn, Jahrb. für Min. 1842. Dav. 1853, p. 73, pl. vii, f. 95–98. Type *S. Burtini*, Defr., Dav. l. c. =*Strigocephalus*, Defr. bene corrig.

Strophalosia, King. *Productidæ.* **1844.**

Ann. Mag. Nat. Hist. xiv, p. 313. No ex. cited. Ibid. l. c. 1846, xvii, p. 92. Type *Orthis excavatus*, Geinitz, Neues Jahrb. 1842, p. 578, pl. x, f. 12, 13 (Dev.). King, Perm. foss. p. 93, pl. xii, f. 13–17, 1850. Syn. *Orthothrix*, Geinitz; *Leptaenolosia* (olim), King.

Stropheodonta, Hall. *Strophomenidæ.* **1852.**

Pal. N. Y. ii, p. 63. Type *S. demissa*, Conrad; figures *S. prisca*, Hall, pl. xxi, f. 9 *a–b*, 1852. Dav. 1856, Intr. p. 203, note. Mon. Sil. Brach. p. 386. Brit. Foss. Brach. appendix, p. 28, 1874. = *Strophodonta*, Hall, emend.

Strophesia, Rafinesque. *Brachiopoda.* **1820.**

Ann. Gen. Sci. Phys. Bruxelles, v, p. 232; name cited without diagn. or ex. Mon. Biv. Shells Ohio, p. 8; no ex. cited. *Genus incert.*

Strophodonta, Hall. *Strophomenidæ.* **1850.**

Proc. Am. Assoc. 1850, p. 348; 10th Reg. Rep. p. 138, f. 12. *S. demissa*, Conr. sp. (Ham. Gr.) Rep. Pal. Iowa, t. ii, f. 5 *a–c*; Journ. Acad. Nat. Sci. Phil. viii, p. 258, t. 14, f. 14, 1842. (Scr. *Stropheodonta*.)

Stropholosia, Gray. *Productidæ.* **1848.**

Ann. Mag. Nat. Hist. ii, p. 438; lapsus, = *Strophalosia*, King.

Strophomena, Blainville. *Strophomenidæ.* **1825.**

Man. Mal. i, p. 513, ii, pl. liii, f. 2. Sole ex. *S. rugosa*, Bl., which (fide Meek) is *S. planumbona*, Pal. Ohio, i, p. 73, 1873, = *Leptaena planumbona*, Hall, 1847, Pal. N. York, vol. i, p. 112, pl. xxxi B, f. 4 *a–c*. Adt. King, Perm. Foss. p. 103, 1850. See *Hemipronites*, Pander.

Strophomena, King. *Strophomenidæ.* **1846.**

Ann. Mag. Nat. Hist. xviii, p. 36. Type *S. rugosa*, (Raf.) Bl.

King here considers Blainville's type congeneric with *Leptaena alternata*, which has socket-valve concave, while *planumbona* had been said to have it convex. But in Perm. Fos. p. 103, Professor King concludes that it is concave in *planumbona* also, which appears to be the fact.

Strophomena, Davidson. *Strophomenidæ.* **1853.**

Intr. p. 105, pl. viii, f. 157–159. Type *S. planumbona*, Hall. Dav. l. c. includes *Orthis? pecten*, Dalm. Ibid. 1856, p. 200. Ditto, Sharpe, Quart. Journ. Geol. Soc. London, iv, p. 178. (= *Strophomena*, Blainv.)

Strophomena, Meek. *Strophomenidæ.* **1873.**

Pal. Ohio, i, p. 73, pl. v, f. 6 *a–c*. Type *S. rhomboidalis*, Wilck. [= *Leptaena*, Dalman, King, not of Davidson.] (= *Plectambonites*, Pand.)

Strophomenes, Rafinesque. (*Incertæ sedis.*) **1820.**

Annals Gen. Sci. Phys. Bruxelles, v, p. 232, 1820. Name only; no diagn. or ex. cited. "Annals of Nature, Oct. 1, 1820", fide Rafinesque, but not to be found there. Descr. Rem. Objects Cab. Raf., Nov. 1831, p. 4. 1st sp. *S. levigata*, Raf. foss. Ohio Limestone; descr. insufficient. Defrance, Tabl. p. 6, 1824; name only. No ex. cited. (*Genus indeterminate.*)

Professor Hall says he saw, in Rafinesque's cabinet, after it had passed through several hands, a specimen of *Strophomena rhomboidalis*, Wilckens, labelled by Raf. as *S. rugosa*. But this is insufficient to determine the character of his original type, even if the label had certainly not been misplaced, as Rafinesque has even united a coral and a *Trigonia* in one genus as brachiopods! The genus must stand as of Blainville, and by his figured type, if it is to be retained at all. See *Hemipronites*, Pander.

Strophomenes, Steining. *Strophomenidæ.* **1831.**

Verst. der Eifel, p. 36. Not seen. (= *Orthis*, Dalman.)

Strophomenidæ, King. *Arthropomata.* **1846.**

Ann. Mag. Nat. Hist. xviii, p. 28. Fam. Brach. cont. *Strophomena*, *Orthis*, *Leptæna*, *Chonetes*.

Strophomenidæ, King. *Arthropomata.* **1850.**

Perm. Foss. p. 81. Fam. Brach. cont. *Strophomena, Leptaena, Chonetes, Orthis, Schizophoria, Streptorhynchus, Orthisina, Dicœlosia, Platystrophia.*

Strophomenidæ, Davidson. *Arthropomata.* **1853.**

Intr. p. 51. Fam. Brach. cont. *Orthis, Orthisina, Strophomena, Leptaena.*

Strophomenidæ, Davidson. *Arthropomata.* **1856.**

Intr. p. 90. Fam. Brach. cont. *Porambonites; Orthis,* with subg. *Orthisina; Strophomena,* with subg. *Leptæna; ? Davidsonia.*

Strophonema, Rang. *Strophomenidæ.* **1829.**

Man. Moll. p. 261; Gray, Ann. Mag. Nat. Hist. ii, 1848, p. 438, lapsus; = *Strophomena,* Raf.

Strygocephale, Blainville. *Terebratulidæ.* **1825.**

Man. Malac. p. 511, pl. liii, f. 1. *Ter. Burtini,* Defr. l. c. (= *Stringocephalus,* Sandb.)

Strygocephalus, Bronn. *Terebratulidæ.* **1848.**

Index Pal. iii, p. 1208; lapsus, = *Strigocephalus,* Defr.

Styriasis, Rafinesque. *Brachiopoda.* **1831.**

Mon. Biv. Shells Ohio, p. 8. No ex. cited. *Genus incert.*

Suessia, Deslongchamps. *Spiriferidæ.* **1854.**

Annales Inst. des Provinces, 1854. Dav. Mon. Brit. Fos. Brach. i, p. 28. Appendix, 1854. Dav. 1856, p. 165, pl. ix, f. 6, 13–18. Type *S. imbricata,* Desl. l. c. (subg. *Spirifer*).

Syntrielasma, Meek. *Pentameridæ.* **1865.**

Proc. Acad. Nat. Sci. Phil. Dec. 1865, p. 277. Geol. Rep. Illinois, Pal. Vol. ii, p. 321, f. 36–37. Type *Spirifer hemiplicatus,* Hall, 1862. Stansbury's Great Salt Lake Rep. p. 409, pl. iv, f. 3 *a–b.*

Syntrilasma, Carpenter. *Pentameridæ.* **1867.**

Ann. Mag. Nat. Hist. xx, p. 73, passim; Quenstedt, Petref. Deutschl. ii, p. 724, 1871; lapsus, = *Syntrielasma,* Meek.

Syphnothyridæ, Quenstedt. *Arthropomata.* **1871.**

Petref. Deutschl. ii, p. 27. Subsect. *Productidæ* cont. *Productus, Protonia, Chonetes, Koninckina, Strophalosia, Gryphites, Bufocephalus, Pyxis.*

Syringothyris, Winchell. *Spiriferidæ.* **1863.**

Proc. Acad. Nat. Sci. Phil. Jan. 1863, p. 6. Type *S. typa,* Winchell, l. c. (= *Spirifer cuspidatus?*) Cf. King, Ann. Mag. Nat. Hist. 1868, ii, July, p. 1, pl. ii, iii. (Sil.)

Telestrophis, Agassiz. *Invertebrata.* **1847.**

Nom. Zool. Index, p. 1047. = *Telistrophis,* Raf. corrig.

Telistrophis, Rafinesque. (*Incertæ sedis.*) **1832.**

Atlantic Journal iv, p. 142, f. 7. Sole ex. *T. torsula,* Raf. l. c. ? = *Spirifer* sp., distorted. *Genus incert.*

Tendinosa, Reeve. *Brachiopoda.* **1841.**

Conch. Syst. i, p. 174. Tribe Brach. cont. *Lingula, Terebratula.* (= *Pedunculata,* Berth.)

Terebraria, Rafinesque. *Brachiopoda.* **1831.**

Mon. Biv. Shells Ohio, p. 7. Fam. Brach. cont. sect. *Macrilia, Isilia, Platilia.*

Terebratella, D'Orbigny. *Terebratulidæ.* **1847.**

Comptes Rendus, xxv, p. 269. No ex. cited. Pal. Franç. Ter. Cret. iv, p. 110, 1847. Ann. Sci. Nat. viii, p. 247. Type *Ter. chilensis*, Brod. = *Terebratula dorsata*, Lamarck. An. s. Vert. v, vii, p. 331, 1819. Dav. 1853, p. 65. Sowerby, Thes. Conch. viii, p. 346, t. 68, f. 15, 16, 17. (Recent.) Syn. *Delthyris*, Mke.; *Ismenia*, King.

Terebratellidæ, King. *Arthropomata.* **1850.**

Perm. Foss. p. 245. Fam. Brach. cont. *Terebratella, Megerlia, Ismenia.*

Terebratula, Llhwyd. *Terebratulidæ.* **1699.**

Lith. Brit. Ichn. p. 40, no. 827–865. Non-binomial. Adt. Lang. 1708, Klein, 1753, &c. Cf. *Terebratula*, Müller.

Terebratula, Klein. *Arthropomata.* **1753.**

Ostracol. p. 171, pl. xi, f. 74. Non-binomial. 1st sp. *T. simplex*, Klein, l. c. = *Terebratula*, sp.

Terebratula, O. F. Müller. *Terebratulidæ.* **1776.**

Prodr. Zool. Danica, pp. xxxi and 249. 1st sp. *T. cranium*, Müller, Others, = *Terebratulina*, sp. and indeterminate. Müller cannot be said to have settled the type; his indeterminate sp. *may* have been *T. vitrea*. Cuvier, 1798, Tabl. Élém. p. 434; 1st sp. *Terebratula vitrea*; Gray, B. M. Cat. p. 17, f. 3 *a–b*. In synonymy of this, he (Cuvier) places *Anomia terebratula*, Linné. Lam. Prodrome, 1799, p. 89, sole ex. *Anomia terebratula*, Linné, = (fide Hanley), *Terebratula perovalis*, Sow. Dav. Mon. Ool. Brach. p. 51, pl. x, f. 1–6. (Oolitic.) Lam. Syst. 1801, same type.

T. vitrea, Lam., and *T. perovalis*, Sow., are generally accepted as the types of the genus as now restricted. But if it is insisted that Müller's first species must be taken as type, *Terebratula* would = *Waldheimia* (*Eudesia*), as generally understood, and the present *Terebratulæ* would have to take the name of *Gryphus*, Megerle.

Terebratulacea, Menke. *Brachiopoda.* **1830.**

Synops. Mus. Menkeanum, ed. ii, p. 95. Fam. Brach. cont. *Terebratula, Atrypa, Uncites, Gypidia, Magas, Delthyris, Cyrtia, Orthis, Monotis, Leptaena, Megorima, Apleurotis.*

Terebratulaceæ, Menke. *Terebratulidæ.* **1828.**

Syn. Mus. Mke. p. 56, olim. Fam. Brach. cont. *Terebratula, Magas.*

Terebratuladæ, Leach, MS. *Arthropomata.* **1847.**

Gray, Ann. Mag. Nat. Hist. xx, p. 273. Fam. Brach. cont. *Terebratula.*

Terebratulæ, Deshayes. *Arthropomata.* **1830.**

Enc. Méth. iii, p. 553, tabl. Fam. Brach. cont. *Terebratula*, sensu magno.

Terebratulanina, Gray. *Arthropomata.* **1853.**

Brit. Mus. Cat. Brach. p. 15. Tribe Brach. cont. *Terebratula, Terebratulina, Waldheimia.*

Terebratularius, Dumeril. *Terebratulidæ.* **1806.**

Zool. Analyt. p. 168. = *Terebratula*, Auct.

Terebratulidæ, Gray. *Arthropomata.* **1840.**

Synops. Cont. Brit. Mus. i, p. 155. Fam. Brach. cont. *Terebratula, Spirifer.*

Terebratulidæ, M'Coy. *Arthropomata.* **1844.**

Carb. Foss. Ireland, p. 150. Fam. Brach. cont. *Delthyridæa, Terebratula, Cyclothyris, Atrypa, Seminula.*

Terebratulidæ, King. *Arthropomata.* **1846.**

Ann. Mag. Nat. Hist. xviii, p. 28. Fam. Brach. cont. *Terebratula, Hypothyris, Pentamerus, Camerophoria, Uncites.*

Terebratulidæ, D'Orbigny. *Arthropomata.* **1847.**

Comptes Rendus, xxv, p. 269. Fam. Brach. cont. *Terebratella, Terebratula, Terebrirostra, Fissirostra.*

Terebratulidæ, Gray. *Arthropomata.* **1848.**

Ann. Mag. Nat. Hist. ii, p. 436. Fam. Brach. cont. "*Magas, Terebratula, Terebratulina, Terebrirostris, Fissirostris, &c.*"

Terebratulidæ, King. *Arthropomata.* **1850.**

Perm. Foss. p. 81 (p. 244 olim). Fam. Brach. cont. *Epithyris, Terebratella, Terebratula, Pygope, Eudesia, Megerlia, Waldheimia.*

Terebratulidæ, King. *Arthropomata.* **1850.**

Perm. Foss. p. 245. Fam. Brach. cont. *Terebratula, Terebratulina, Delthyridæa, Waldheimia, Epithyris, Pygope.*

Terebratulidæ, Davidson. *Arthropomata.* **1853.**

Intr. p. 51. Fam. Brach. cont. *Terebratula*, subg. *Terebratulina, Waldheimia; Terebratella*, subg. *Trigonosemus, Terebrirostra, Megerlia; Kraussia, Magas, Bouchardia, Morrisia, Argiope.*

Terebratulidæ, Davidson. *Arthropomata.* **1856.**

Intr. p. 90. Fam. Brach. cont. *Terebratula* with subg. *Terebratulina, Waldheimia; Terebratella*, with subg. *? Trigonosemus, ? Terebrirostra, Megerlia, Kraussia, Magas, Bouchardia, Morrisia;* subfam. *Thecideidæ*, with *Argiope*, and subg. *Zellania; Stringocephalus; Thecidium.*

Terebratulidæ, Dall. *Arthropomata.* **1870.**

Am. Journ. Conch. vi, p. 99. Fam. Brach. cont. *Terebratulinæ, Stringocephalinæ, Magasinæ, Kraussininæ, Megathyrinæ, ? Platidiinæ, ? Thecidiinæ.*

Terebratulidæ, Quenstedt. *Arthropomata.* **1871.**

Petref. Deutschl. ii, p. 27. Sect. i of *Mesopygia*, cont. *Hypothyridæ, Epithyridæ.*

Terebratulidea, Sowerby. *Brachiopoda.* **1822.**

Trans. Lin. Soc. Lond. xiii, p. 469. = *Brachiopoda,* auctt.

Terebratulina, Giebel. *Brachiopoda.* **1846.**

Palæoz. Faun. p. 121. Fam. Brach. cont. *Terebratula, Delthyris, Thecidea, Magas, Trigonotreta, Spirifer, Orbicula.*

Terebratulina, D'Orbigny. *Terebratulidæ.* **1847.**

Comptes Rendus, xxv, p. 268. No ex. cited. D'Orb. Ann. Sci. Nat. viii, p. 249. Type *T. caputserpentis,* Lin. pl. vii, f. 7, 8, 17, 1848. Ib. xiii, p. 339, 1850. Dav. 1856, p. 121, pl. vi, f. 7-10, 24. Syn. *Agulhasia,* King.

Terebratulinæ, Dall. *Terebratulidæ.* **1870.**

Am. Journ. Conch. vi, p. 99. Subfam. Brach. cont. *Terebratula, Rennselaeria, Terebratulina, Waldheimia;* with subgenera *Terebratula, Centronella, Epithyris?, Pygope, Waldheimia, Cryptonella, Meganteris.*

Terebratulites, auctt. *Arthropomata.*

Walch, Schröter, and others, used to denote fossil species of *Brachiopoda.*

Terebratulites, Schlotheim. *Arthropomata.* **1820.**

Petref. p. 250, pl. 20, 37, 40. Sectio *Anomites,* cont. Brach. Arthrop. sp. foss.

Terebrirostra, D'Orbigny. *Terebratulidæ.* **1847.**

Comptes Rendus, xxv, p. 268. No ex. cited. Pal. Franç. Ter. Cret. iv, p. 146, 1847. Type *Terebratula lyra,* Sow. = *Lyra Meadii,* Cumb. Ann. Sci. Nat. xiii, p. 345, 1850. Journ. de Conchyl. ii, p. 222, 1851. (= *Lyra,* Cumb.)

Terebrirostris, Gray. *Terebratulidæ.* **1848.**

Ann. Mag. Nat. Hist. ii, p. 436; lapsus, = *Terebrirostra,* D'Orbigny.

Thecidæ, D'Orbigny. *Arthropomata.* **1847.**

Comptes Rendus, xxv, p. 269. Ibid. Cours Élém. Pal. p. 80, 1849. Fam.

Thecideæ, Deshayes. *Arthropomata.* **1830.**

Enc. Méth. iii, p. 553, tabl. Fam. Brach. cont. *Thecidea.*

Thecideidæ, Gray. *Arthropomata.* **1840.**

Synops. Cont. Brit. Mus. i, p. 155; ii, pp. 85, 92. Fam. Brach. cont. *Thecidea.* Adt. King, Ann. Mag. Nat. Hist. xviii, p. 28, 1846. Dav. 1853, p. 51. (Mel. *Thecidiidæ.*)

Thecideidæ, Davidson. *Arthropomata.* **1856.**

Intr. p. 90. Subfam.? *Terebratulidæ* cont. *Argiope* and subg. *Zellania, Stringocephalus,* and *Thecidium.*

Thecideum, Lacaze Duthiers. *Thecidiidæ.* **1861.**

Ann. Sci. Nat. Zool. xv, p. 262, pl. i–iv. *T. mediterraneum,* Sow. (= *Thecidium,* Sow.)

Thecidiidæ, Dall. *Arthropomata.* **1870.**

Am. Journ. Conch. vi, p. 147. Cat. Rec. Brach. Proc. Acad. Nat. Sci. Phil. 1872, p. 195. Fam. Brach. cont. *Thecidium.*

Thecidiinæ, Dall. *Thecidiidæ.* **1870.**

Am. Journ. Conch. vi, p. 100. Subf. cont. *Thecidium.*

Thecidioidæ, Agassiz. *Arthropomata.* **1847.**

Nom. Zool. Index, p. 1061. = *Thecidæadæ,* Gray corrig.

Thecidium, Sowerby. *Thecidiidæ.* **1844.**

Genera of Shells, xx. Dav. 1853, p. 77, pl. vi, f. 35–38. Type *Thecidea radiata,* Defr. = *T. pumilum,* Lam. (Cret.) Dav. l. c. (= *Thecidea,* Defr. corrig.

Trematis, Sharpe. *Discinidæ.* **1847.**

Quart. Journ. Geol. Soc. London (June), iv, p. 66. Type *Orbicula terminalis,* Conrad, Nat. Hist. N. York, iv, Geol. by Emmons, p. 395, f. 4, 1842. Dav. 1856, pl. xiv, f. 4–7. (Trenton.) (Syn. *Orbicella,* D'Orb.)

Trematospira, Hall. *Spiriferidæ.* **1857. 1859.**

Pal. N. York, vol. iii, 1859, p. 207. 1st sp. mentioned l. c. pp. 207–9, *Spirifer? multistriatus,* Hall, Reg. Rep. 1856, Pal. N. York, iii, pl. 24, f. 3 *a-t,* pl. 28, f. 5 *a-f.* (Sil.) Cf. 12th Reg. Rep. (Oct. 1859), pp. 27–8, *T. multistriatus,* Hall, l. c. f. 3–4. (Comp. *Retzia,* King.)

Tretenterata, King. *Brachiopoda.* **1873.**

Ann. Mag. Nat. Hist. 4th ser. xii, July, 1873, p. 15. Subclass cont. the inarticulate brach. (= *Lyopomata,* Owen.)

Trigonella, Quenstedt. *Terebratulidæ.* **1871.**

Petref. Deutschl. ii, p. 27, pl. 45, f. 1–2. Gen. Epithyrid. Type *Terebratula trigonella,* Schloth. Petref. 1820, p. 271, = *Trigonella suevica,* Schröter (non-binomial), fide Quenstedt, l. c. Not *Trigonella,* Da Costa. (= *Eudesia,* King.)

Trigonellæ, Fischer de Waldheim. *Invertebrata.* **1809.**

Notice Fos. Gouv. Moscou, p. 35. Sect. Terebratulidarum. Included some species of trigonal brachiopods. Not used in a strictly generic sense. (= *Trigonella,* Quenst. auct.)

Trigonosema, Paetel. *Terebratulidæ.* **1875.**

Fam. u. Gatt. Moll. p. 212; lapsus, = *Trigonosemus*, Kön.

Trigonosemus, König. *Terebratulidæ.* **1825.**

Icones Foss. Sectil. p. 3, pl. vi, f. 73. (Cret.) Type *T. elegans*, Kön. l. c. fide Dav. 1856, p. 126, pl. vii, f. 6, 7, 8. Mon. Cret. Brach. p. 29, pl. iv, f. 1-4. Syn. *Fissurirostra*, D'Orb.

Trigonosmus, Paetel. *Terebratulidæ.* **1875.**

Fam. u. Gatt. Moll. p. 212; lapsus, = *Trigonosemus.*

Trigonoremus, Gray. *Terebratulidæ.* **1848.**

Ann. Mag. Nat. Hist. ii, p. 438; lapsus, = *Trigonosemus.*

Trigorima, Rafinesque. *Brachiopoda.* **1831.**

Mon. Biv. Shells Ohio, p. 7. No ex. cited. *Genus incert.*

Trigonotetra, Davidson. *Spiriferidæ.* **1856.**

Intr. expl. pl. viii, f. 21. *Spirifera disjuncta*, Sow. Id. Keferstein, 1829. Zeit. Geogn. p. 85; lapsus, = *Trigonotreta*, Kön.

Trigonotreta, König. *Spiriferidæ.* **1825.**

Icones Foss. Sectiles, no. 70, p. 3. (Gen. cont. *Spirifer* sp. et *Orthis* sp. &c. fide Bronn.) Adt. King. Perm. Foss. pp. 81, 126, 1850. *T. stokesii*, Kön. l. c. selected as type; = (?) *Ter. aperturatus*, Schloth. Petref. i, p. 258, ii, p. 67, pl. 17, f. 1 (fide Bronn). (= *Spirifer*, Sow.)

Trigonotreta, Meek and Hayden. *Spiriferidæ.* **1864.**

Pal. Upper Missouri (Carb.), p. 19. Mr. Meek, having adopted *S. cuspidatus* as the type of *Spirifer*, revives *Trigonotreta*, König, to contain *Spirifer striatus*, Sow. (commonly regarded as the type,) and its congeners. (= *Spirifer*, Dav.)

Trimecella, "Dalman", Paetel. *Trimerellidæ.* **1875.**

Fam. u. Gatt. Moll. p. 212; lapsus, = *Trimerella*, Bill.

Trimerella, Billings. *Trimerellidæ.* **1862.**

Pal. Foss. Canada (June), p. 166, vol. i, f. 151, *a-b*. Type *T. grandis*, Bill. l. c. (Sil.) Dav. & King, Quart. Journ. Geol. Soc. May, 1874, p. 124, pl. xiii, f. 2, 3.

Trimerellidæ, Davidson and King. *Lyopomata.* **1874.**

Quart. Journ. Geol. Soc. London (May), p. 142. Fam. Brach. cont. *Trimerella, Monomerella, Dinobolus.*

Triplesia, Hall. *Rhynchonellidæ.* **1859.**

12th Reg. Rep. p. 44 (Oct.), f. 1-3. Type *T. extans*, Hall, l. c. = *Atrypa extans*, Emmons, Geol. Rep. 3d Distr. N. Y. 1843. (Scr. *Triplasia.*) Not *Triplasia*, Reuss, 1854, g. foramin. (Syn. *Dicraniscus*, Meek.)

Tropidoleptus, Hall. *Arthropomata.* **1857.**

10th Regent's Rep. p. 151, f. 1-2. 12th do. p. 31, f. 1-4, 1859. Type *Strophomena carinata*, Conrad, Ann. Rep. Geol. N. York, 1839, p. 64; Hall, l. c. In notice Pal. N. York, vol. iv, p. 23, f. 1-2, Mar. 1867, this genus is pointed out as close to *Leptocoelia*, and probably belonging to the fam. *Terebratulidæ.* (Dev.) (Comp. *Leptocoelia*, Hall, 1859.)

Brachiopoda. **1831.**

ted. Atlantic Journ. iii, p. 122, *Gen. incert.*)

Coelenterata.

Calceola sp. and some brachiopods

Brachiopoda.

Spiriferidæ. **1825.**

p. 630. (Dev.) Type *Terebratulites gryphus*, p. 173, pl. ix, f. 50–56.

igny. *Arthropomata.* **1849.**

l. p. 80. Fam. Brach. cont. *Uncites, Atrypa, Pentamerus.*

der. *Obolidæ.* **1830.**

gn. Russ. Reiches, pp. 55–7. 1st sp. *U. convexa*, Pand. p. , f. 1. (L. Sil.) = *Obolus apollinis*, Eichw. (1829), Zool. Spec. i, iv, f. 5. Dav. 1856, p. 245, pl. xiv, f. 35–39. Five out of six of s sp. are stated by Bronn (Ind. Pal. iii, 1342) to be vars. of *O. nis.* The other sp. = *O. ingricus*, Eichw. l. c. p. 274. (= *Obolus*, hw.)

Quenstedt notes (Petr. Deutschl. 1871, p. 669) that this genus was mentioned in Rose, "Reise nach dem Ural", the publication of which was begun by Engelhardt, of Dorpat, in the spring of 1829 (but not finished until 1837). Pander's work passed the censor in November, 1829, and was probably published by January, 1830. No sufficient evidence has yet been adduced to show that Pander's name preceded that of Eichwald, and if it stand at all (it seems as if several forms were included in Pander's very bad figures) it cannot be on the first species.

gulites, Bronn. *Obolidæ.* **1848.**

Ind. Pal. iii, p. 1342. Quenst. 1871, Petr. Deutschl. p. 725 († Wiegm. Arch. 1837, p. 143). Lapsus, (= *Ungula*, Pand.)

gulites, Quenstedt. *Trimerellidæ.* **1871.**

Petref. Deutschl. ii, p. 669. Cont. *Dinobolus*, sp. fide Dav. and King.

rticites, auctt. *Invertebrata.* ——.

Defrance, Dict. Sci. Nat. lvi, p. 383, 1828, in syn. (= *Hysterolithus*, auctt.)

itulina, Hall. *Arthropomata.* **1860.**

13th Regent's Rep. p. 72 (Dec.), f. 1–2. No specific name applied. (Hamilton Gr.) Pal. N. York, iv, p. 410, pl. 62, f. 1, *a–i.* Sole ex. *V. pustulosa*, Hall, l. c. Not *Vitulina*, Swains. gen. Gasterop. 1840.

Probably belongs to the *Terebratulidæ.*

Volborthia, Mëllera. *Siphonotretidæ.* **187**

(Extr.) Verh. Min. Ges. St. Petersburg, 1873, p. 1–7, pl. i, f. 1–6. (In Russian.) Type *Acrotreta recurva*, Kutorga, l. c. 1847, p. 277, t. vii, f. 9, 1848. *Hyolithes* sp. Eichw. Leth. Ros. p. 905.

Waldheimia, King. *Terebratulidæ.* **185**

Perm. Foss. p. 81, 145. Type *Terebratula flavescens*, Lam. Hist. An. s. Vert. vi, p. 246, 1819, = *Waldheimia australis*, King, l. c. pl. xx, f. 10–12. Reeve, Conch. Icon. t. i; t. ii, f. 1 *a–b*. Cf. *Eudesia*, King.

This genus, or subgenus, which has come into very general use, and is represented by a number of recent species, most unfortunately bears a name which is preoccupied by Brullé, in *Hymenoptera*, since 1846. Brullé's genus is stated on good authority to be tenable, and hence the writer proposes to revive the name of *Eudesia* (which see) for this group. (Cf. Brullé, Hist. Nat. des Insectes Hym. iv, p. 665, Nov. 1846. Types *Tenthredo Brasiliensis*, Lep. St. Fargeau, and *W. Orbignyana*, Brullé, l. c. pl. 46, f. 8.)

Waltonia, Davidson. *Terebratulidæ.* **185**

Ann. Mag. Nat. Hist. p. 475. Type *W. Valenciennesii*, Dav. l. c. pl. xv, f. 1 *a–d*. Ib. l. c. 1852, p. 372, subg. *Magas*. Id. l. c. 1861, p. 34, olim. Founded on an immature and apparently imperfect Terebratulid; perhaps a *Terebratella*.

Zellania, Moore. *Terebratulidæ.* **185**

Proc. Somerset Archæol. Nat. Hist. Soc. 1854.* Dav. 1856, p. 141, pl. vii, f. 43–44. Type *Z. Davidsonii*, Moore, l. c. (= *Cistella*, Gray.)

Zonarites, Rafinesque. *Brachiopoda.* **183**

Enum. Rem. Obj. Cab. Raf. p. 4. Sole ex. *Z. atrata*, Raf. l. c. fos. Kentucky. (*Genus incert.*)

[redacted]

SYSTEMATIC LIST OF THE GENERA.

Genera or subgenera admitted to be valid, or not sufficiently known to the author to be reasonably questioned, are printed in upright letters.

Synonymes, or names suspected to be such, are indented; absolute synonymes are in italics, the others in upright letters; both under the name to which they are referred, or suspected to belong.

An asterisk marks non-binomial synonymes.

An interrogation-mark [?] indicates that the family relations are doubtful. The same in parentheses (?) indicates that the synonyme so marked cannot be definitely referred to any genus, or may denominate an assemblage of species which should be distributed among several groups. Before a name not indented, it indicates a doubt as to its validity.

The name following a genus refers to the author who used it in the sense indicated by its allocation here, and not necessarily the author who first used it. This holds good throughout these lists.

It must be borne in mind that this arrangement is merely tentative and subject to reform.

Fam. TEREBRATULIDÆ.

(*Terebratulinæ.*)

Terebratula, Müller.
- * *Terebratula*, Llhwyd.
- * *Sacculus*, Llhwyd.
- * *Lampas*, Meuschen.
- * *Terebratulites*, Schlotheim.
- *Terebratularius*, Dumeril.
- *Lampas*, sp. Humphrey.
- *Gryphus*, Megerle.
- *Lampus*, Sowerby.
- *Musculus*, Quenstedt.
- *Nucleata*, Quenstedt.

(?) Epithyris, King, not Phillips.
- *Epithyrus*, Paetel.
- *Seminula*, M'Coy, 1855.
- *Dielasma*, King.

Centronella, Billings.
- *Cryptonella*, Hall, 1861–3.

(?) Rennselæria, Hall.

(?) Leptocoelia, Hall, 1859.

Pygope, Link.
- * *Diphyites*, Schröter.
- *Pugites*, De Haan.
- *Antinomia*, Catullo.

(?) Orthotoma, Quenstedt.

(?) Vitulina, Hall, not Swainson.

Terebratulina, D'Orbigny.
- Agulhasia, King.

Cryptonella, Hall, 1867.
- ? Cryptonema, Bigsby.
- *Cryptocella*, Paetel, not Adams.

Meganteris, Suess.

Eudesia, (King) Dall.
- *Waldheimia*, King, not Brullé.
- *Macandrevia*, King, not Gray.
- (?) Gwynia, King.
- *Trigonella*, Quenstedt.
- *Cincta*, Quenstedt.
- Cryptacanthia, White & St. John.

Lyra, Cumberland.
- *Terebrirostra*, D'Orbigny.
- *Terebrirostris*, Gray.

(*Magasinæ.*)

Trigonosemus, König.
- *Trigonoremus*, Gray.
- *Trigonosmus*, Paetel.
- *Trigonosema*, Paetel.
- *Fissirostra*, D'Orbigny.
- *Fissurirostra*, D'Orbigny.
- *Fissirostris*, Gray.
- *Fissuristra*, Paetel.
- *Delthyridea*, King.
- *Deltyrydæa*, Davidson.
- *Delthiridæa*, Gray.

? Hynniphoria, Suess.
- *Hinniphoria*, Bronn.

Terebratella, D'Orbigny.
- *Delthyris*, Menke.
- *Ismenia*, King.
- *Waltonia*, Davidson.

Laqueus, Dall.

Megerlia, King, not Rob-Desv.
- *Megerlea*, Davidson.
- *Orthis*, Menke.
- *Orthis*, Philippi.

(?) Frenula, Dall.
- *Ismenia*, King, olim.
- *Ismenia*, Gray, Dall.

Kingena, Davidson.

Magasella, Dall.

? Tropidoleptus, Hall.

Platidia, Costa.
- *Morrisia*, Davidson.

Bouchardia, Davidson.
- *Pachyrhynchus*, King.

Magas, Sowerby.
- *Majas*, Keferstein.
- *Megas*, Isensee.
- (?) Mannia, Dewalque.

Rhynchora, Dalman (pars).
Rhynchura, Agassiz.
Rhyncora, Gray.
Kraussina, Davidson.
Kraussia, Davidson.
Kraussinina, Paetel.

(*Megathyrinæ.*)

Megathyris, Bronn.
Megathiris, D'Orbigny.
Argyope, Deslongchamps, not Savigny.
Argiope, Deslongchamps, not Savigny.
Cistella, Gray.
Zellania, Moore.

Fam. THECIDIIDÆ.

Thecidium, Sowerby.
Thecidea, Defrance.
Thecidæa, Gray.
Thecideum, Lacaze Duthiers.

Fam. STRINGOCEPHALIDÆ.

Stringocephalus, Sandberger.
Strygocephale, Blainville.
Strygocephalus, Bronn.
Strigocephalus, Defrance.

Fam. PENTAMERIDÆ.

Anastrophia, Hall.
Brachymerus, Shaler.
Amphigenia, Hall.

Fam. RHYNCHONELLIDÆ.

Rhynchonella, Fischer.
Rhynchonelle, Fischer.
Rhyngonella, Bronn.
* *Oxyrhynchus*, Llhwyd.
Stenocisma, Hall, 1867.
Rhynchotrema, Hall.
Hypothyris, Phillips.
Hypothyris, King.
Cyclothyris, Davidson.
Bicornes, Quenstedt.
Acanthothyris, D'Orbigny.
Acanthothiris, D'Orbigny.
Hemithyris, Bronn.
Hemithiris, D'Orbigny.
Hypothyris, Forbes & Hanley.
Rhynchopora, King.
(?) Antirhynchonella, Quenstedt.
Camarella, Billings (pars typ.).
Camerella, Paetel.
Eatonia, Hall.
Elonia, Meek & Hayden.
Dimerella, Zittel.
Atretia, Jeffreys.
Cryptopora, Jeffreys.
(?) Rhynchonellina, Gemellaro.
Triplesia, Hall.
Dicraniscus, Meek.
Leiorhynchus, Hall, not Rud.
Meristella, Hall, olim 1863.
? Eichwaldia, Billings.
Dictyonella, Hall, MSS.

Fam. ATRYPIDÆ.

ris, King.
a, D'Orbigny.
s, Quenstedt.
a, Billings.
s.
um, Hall.
Cozzens.
elia, Hall.
ll, 1861.
, Davidson, 1853.
, Billings.
Hall.
Hall.

Davidson.
ospira, Hall.
spira, Hall.
ospira, Hall.
White.
ia, Hall.
ance.
es, auctt.
erby.
a, J. de C. Sowerby.
us, Blainville.
r, Rafinesque.
olithus, Quenstedt.
, M'Coy.
ites, Fischer.
ites, Quenstedt.
ides, Keferstein.
ris, Dalman.
thyris, M'Coy.
otreta, König, Meek.
otetra, Keferstein.
aria, M'Coy.
Coy.
oelia, Hall.
oilia, Quenstedt.
s, Winchell.
r, King, Meek.
nan.
a, D'Orbigny.
ridson.
na, Hall.
, Quenstedt.
longchamps.
D'Orbigny.

m, Hall.

m. PORAMBONITIDÆ.
es, Pander.
bonites, Agassiz.
nchus, King.

Fam. STROPHOMENIDÆ.

Strophomena, Blainville.
Hemipronites, Meek.
Strophonema, Rang.
Orthis, King, 1850.
Leptaena, sp. Dalman.
Strophomena, Davidson (pars).
Hipparionyx, Vanuxem.
(?) *Orthothetes*, Fischer, 1837.
Orthothetes, Fischer, 1850.
Orthotheles, D'Orbigny.
Orthotetes, Oken.
Streptorhynchus, King.
(?) Plectambonites, Pander.
Leptaena, sp. Dalman.
Leptaena, King, 1846.
Strophomena, Meek, 1873.
Leptagonia, M'Coy.
Leptogonia, Agassiz.
Leptaena, Dalman (pars).
Leptaena, Davidson.
Plectambonites, King.
Stropheodonta, Hall.
Strophodonta, Hall.
Strepheodonta, Marschall.
Klitambonites, Pander.
Pronites, Pander, not Illiger.
Prionites, Agassiz.
Clitambonites, Agassiz.
Hemipronites, Pander.
Hemiprionites, Agassiz.
Gonambonites, Pander.
Orthisina, D'Orbigny.
Orthisina, Davidson.
Orthis, Davidson.
Orthis, Dalman (pars).
Orthambonites, Pander.
Strophomenes, Steininger.
Schizophoria, King.
Platystrophia, King.
Platistrophia, Quenstedt.
(?) Meekella, White & St. John.
Bilobites, Linné.
Dicaelosia, King.
Brachyprion, Shaler.
(Doubtful.)
? Amphiclina, Laube.
? Aulacorhynchus, Dittmar.
? Enteletes, Fischer.
Entellites, Sowerby.
Anteletes, D'Orbigny.
? Iphidea, Billings.
? Tropidoleptus, Hall.
? Skenidium, Hall.

Fam. PRODUCTIDÆ.

Productus, Sowerby.
Producta, Sowerby, jr.
Producta, M'Coy.
Protonia, Link.
* *Pyxis*, Chemnitz.
Arbusculites, Murray.
Arbusculithes, Paetel.
Chonetes, Fischer.
Leptaena, M'Coy.
Chonetus, Paetel.
Productella, Hall.
Strophalosia, King.
Stropholosia, Gray.
Stophalosia, Bronn.
Leptaenalosia, King.
Orthothrix, Geinitz.
Orithothrix, Davidson.
Orthotrix, auct.
Aulosteges, Helmersen.

LYOPOMATA.

Fam. SIPHONOTRETIDÆ.

Siphonotreta, Verneuil.
Siphonotrema, Dana.
Mesotreta, Kutorga.
Acrotreta, Kutorga.
Volborthia, Möller.
? Eichwaldia, Billings.
? Iphidea, Billings.

Fam. TRIMERELLIDÆ.

Trimerella, Billings.
Trimecella, Paetel.
Gatlandia, Dall.
Acritis, Volborth.
Acrites, Dav. & King.
Obolus, Eichwald.
Obulus, Quenstedt.
Ungula, Pander.
Ungulites, Bronn.
Aulonotreta, sp. Kutorga.
(?) Schmidtia, Volborth, not Bals.-Criv.
Dicellomus, Hall.

Fam. LINGULIDÆ.

Dignomia, Hall.
Lingulella, Salter.
Lingulepis, Hall.
Glottidia, Dall.
Glossina, Phillips.
Lingula, Brugière.
Ligula, Cuvier.
Ligularius, Dumeril.
Lingularius, Herrmannsen.
Pharetra, Bolten.

Fam. DISCINIDÆ.

Discina, Lamarck.
Orbicula, Sowerby.
Discinisca, Dall.
Trematis, Sharpe.
Orbicella, D'Orbigny.
Orbiculoidea, D'Orbigny.
Schizotreta, Kutorga.
Shizotreta, Davidson.
Schizocrania, Hall & Whitfield.

Fam. CRANIIDÆ.

Crania, Retzius.
* *Crisocardium*, Poli.

GENERA INCERTÆ SEDIS.

Mostly indeterminable and of Rafinesque.

Amblotrema, Rafinesque.
Amblytrema, Agassiz.
Aplecerotis, Paetel.
Apleurotis, Rafinesque.
**Bufocephalus*, Linné.
**Bursula*, Klein.
**Capsularia*, Llhwyd.
Clipeilia, Rafinesque.
**Conchyliolithus*, Martin.
Cranicella, Rafinesque.
Currulites, Rafinesque.
Cyclothyris, M'Coy.
Delthyridea, M'Coy.
Diclipsites, Rafinesque.
Diclisma, Rafinesque.
Discinella, Hall.
Epithyris, Phillips.
Goniclis, Rafinesque.
Gonotrema, Rafinesque.
Hemiasterias, Herrmannsen.
Hemisterias, Rafinesque.
Megarima, Deshayes.
Megarites, Rafinesque.
Megorima, Rafinesque.
Obovites, Rafinesque.
Orthothetes, Evans, 1829.
Orthothetes, Fischer, 1837.
Pachiloma, Rafinesque.
Pachyloma, Herrmannsen.
* *Peridiolithus*, Hüpsch.
Plachiloma, Ferussac.
Platilites, Rafinesque.
Pleuranisis, Rafinesque.
Pleurecterites, Bronn.
Pleureterites, Rafinesque.
Pleurinea, Rafinesque.
Strophesia, Rafinesque.
Strophomenes, Rafinesque.
Styriasis, Rafinesque.
Telestrophis, Agassiz.
Telistrophis, Rafinesque.
Trigorima, Rafinesque.
Trunculites, Rafinesque.
Zonarites, Rafinesque.

GENERA CONTAINING A HETEROGENEOUS ASSEMBLY, OF WHICH SOME SPECIES ARE KNOWN OR SUPPOSED TO HAVE BEEN BRACHIOPODS.

Anomia, Linné.
**Anomites*, Schlotheim.
**Bucardites*, Argenville.
Clavagella, Goldfuss.
**Ctenites*, Kenntman.
**Cunolites*, auctt.
**Gryphites*, Llhwyd.
**Gryphytes*, Da Costa.
Helmintholithus, Linné.
Hipponyx, Morris.
**Hysterolites*, Schlotheim.
Hysterolithes, Link.
**Hysterolithos*, Grew.
**Hysterolithus*, Aldrovandus.
**Hysteropetra*, Cardan.
**Onychites*, Mercati.
**Ostracites*, Llhwyd.
**Ostreopectinites*, auctt.
Patella, Linné.
**Pectinites*, auctt.
**Pectunculi*, auctt.
**Pectunculus*, Gesner.
**Pectunculites*, Lister.
Pycnodonte, Fischer.
Siphonaria, Quenstedt.
**Stola*, Klein.
Trigonelles, Fischer.
**Trigonellites*, auctt.
**Urticites*, auctt.

GENERA ERRONEOUSLY REFERRED TO THE BRACHIOPODA.

ACEPHALA.

ANOMIIDÆ.

Ænigma, Koch.

CARDITIDÆ.

Orthonota, Emmons.

LUCINIDÆ.

Paracyclas, Hall.

CRUSTACEA.

ENTOMOSTRACA.

Daphnoidea, Hibbert.

COELENTERATA.

CALCEOLIDÆ.

Hypodema, Koninck.
Calceola, Lamarck.
*Calceolites, Schlotheim.
*Crepidites, Schröter.
*Crepidolite, Rozier.
*Crepidolithus, Hüpsch.
*Crepite, Rozier.
*Crepites, Hüpsch.
*Pilolithus, Beuth.
*Sandaliolite, Rozier.
*Sandaliolithus, Hüpsch.
*Sandalite, Rozier.
*Sandalites, Hüpsch.
Sandalium, Oken.
Calceolaria, Griffith.
Rhizophyllum, Lindström.

? ?

Chelodes, (D. & K.) Lindström.

From the preceding list it appears that about four hundred and sixty-three generic and subgeneric names have been rightly or wrongly associated with the group of Brachiopoda. Eighty-seven have been assigned to the *Terebratulidæ*, sixty-five to the *Rhynchonellidæ* as generally understood, fifty-three to the *Spiriferidæ*, and fifty-two to the *Strophomenidæ*. Of all these, only about one hundred and thirty have been at all generally accepted, being about three and a half names to each group. Sixteen families and two orders are here recognized. The general list contains about seven hundred names. It is estimated that there are about ten thousand names and synonymes which have been used in the sub-kingdom of *Mollusca*, taken in its extended sense, of which the Brachiopods contribute about six per cent.

List of the Linnean species of Brachiopoda described in the Systema Naturæ, ed. X and XII, with their modern equivalents, chiefly on the authority of Sharpe, Hanley, and Davidson.

Ed.	Linnean name.	Modern name.
X	*Anomia craniolaris.*	*Crania craniolaris*, Dall.
X	*Anomia pectinata.*	*Trigonosemus pectinatus*, Gray.

owing approximately the known distribution of the chief groups of Brachiopoda in geological time.

	Cambrian.	Silurian.	Devonian.	Carboniferous.	Permian.	Triassic.	Jurassic.	Cretaceous.	Tertiary.	Recent.
ULIDÆ	.	—	—	—	—	—	—	—	—	—
a, Müller	.	?	—	—	—	—	—	—	—	—
a, Billings	.	—	—	.	.	.	.	.	.	.
Hall	.	.	—	.	.	.	.	.	.	.
ptus, Hall	.	.	—	.	.	.	.	.	.	.
s, Suess	.	.	—	.	.	.	.	.	.	.
, King	.	.	.	—	—	.	.	.	.	.
sia King (=*Eudesia*)	.	.	.	—	?	?	—	—	—	—
nberland	.	.	.	.	.	—	—	—	.	.
ink	.	.	.	.	.	.	—	.	.	.
s, Quenstedt	.	.	.	.	.	.	—	.	.	.
lina, D'Orbigny	.	.	.	.	.	.	—	—	—	—
ria, Suess	.	.	.	.	.	.	—	.	.	.
la, D'Orbigny	.	.	.	.	.	.	—	—	—	—
King	.	.	.	.	.	.	—	—	—	—
la, Bronn	.	.	.	.	.	.	—	—	—	—
Gray	.	.	.	.	.	.	—	?	—	—
mus, König	.	.	.	.	.	.	.	—	.	.
Davidson	.	.	.	.	.	.	.	—	.	.
owerby	.	.	.	.	.	.	.	—	?	.
a, Dalman	.	.	.	.	.	.	.	—	.	.
s, Dall	.	.	.	.	.	.	.	.	?	—
Dall	.	.	.	.	.	.	.	.	?	—
s, Dall	.	.	.	.	.	.	.	.	.	—
lia, Davidson	.	.	.	.	.	.	.	.	.	—
Costa	.	.	.	.	.	.	.	.	.	—
a, Davidson	.	.	.	.	.	.	.	.	.	—
	×	×	×	×	×	×	×	×	×	×
DÆ	.	.	.	?	?	—	—	—	—	—
s, Sowerby	.	.	.	?	?	—	—	—	—	—
	×	×	×	×	×	×	×	×	×	×
EPHALIDÆ	.	.	—	.	.	.	.	.	.	.
phalus, Sandberger	.	.	—	.	.	.	.	.	.	.
	×	×	×	×	×	×	×	×	×	×
RIDÆ	.	—	—	—	—	.	.	.	.	.
rus, Sowerby	.	—	—	—	.	.	.	.	.	.
um, Linné	.	—	.	.	.	.	.	.	.	.
dia, Billings	.	—	.	.	.	.	.	.	.	.

Table showing approximately the known distribution of the chief groups of Brachiopoda in geological time—Continued.

	Cambrian.	Silurian.	Devonian.	Carboniferous.	Permian.	Triassic.	Jurassic.	Cretaceous.	Tertiary.	Recent.
Camarella, Billings (sp.)	·	—	·	·	·	·	·	·	·	·
Anastrophia, Hall	·	—	·	·	·	·	·	·	·	·
Amphigenia, Hall	·	·	—	·	·	·	·	·	·	·
Gypidula, Hall	·	·	—	·	·	·	·	·	·	·
Pentamerella, Hall	·	·	—	·	·	·	·	·	·	·
Stenoschisma, (Conrad)	·	·	?	—	—	·	·	·	·	·
Syntrielasma, Meek	·	·	·	—	·	·	·	·	·	·
	×	×	×	×	×	×	×	×	×	×
RHYNCHONELLIDÆ	·	—	—	—	—	—	—	—	—	—
? *Eichwaldia*, Billings	·	—	·	·	·	·	·	·	·	·
Eatonia, Hall	·	—	·	·	·	·	·	·	·	·
Triplesia, Hall	·	—	·	·	·	·	·	·	·	·
Antirhynchonella, Quenstedt	·	—	·	·	·	·	·	·	·	·
Camarella, Billings (pars)	·	—	·	·	·	·	·	·	·	·
Rhynchonella, Fischer	·	—	—	—	—	—	—	?	·	·
Leiorhynchus, Hall, not Rud	·	·	—	?	·	·	·	·	·	·
Rhynchopora, King	·	·	·	·	—	·	·	·	·	·
Dimerella, Zittel	·	·	·	·	·	—	?	?	?	—
Rhynchonellina, Gemellaro	·	·	·	·	·	·	—	·	·	·
Acanthothyris, D'Orbigny	·	·	·	·	·	·	—	—	·	·
Hemithyris, Broun	·	·	·	·	·	·	?	—	—	—

owing approximately the known distribution of the chief groups of Brachiopoda in geological time—Continued.

	Cambrian.	Silurian.	Devonian.	Carboniferous.	Permian.	Triassic.	Jurassic.	Cretaceous.	Tertiary.	Recent.
Davidson	·	—	—	—	·	·	·	·	·	·
ira, Hall	·	—	—	·	·	·	·	·	·	·
pira, Hall	·	—	·	·	·	·	·	·	·	·
ing	·	—	—	—	·	·	·	·	·	·
ia, White	·	·	·	—	·	·	·	·	·	·
lla, Billings	·	·	—	·	·	·	·	·	·	·
sia, Cozzens	·	·	—	·	·	·	·	·	·	·
Defrance	·	·	—	·	·	·	·	·	·	·
ne, D'Orbigny	·	—	—	—	—	—	—	·	·	·
oelia, Hall	·	·	—	?	·	·	·	·	·	·
sia, M'Coy	·	·	—	—	·	·	·	·	·	·
hyris, Winchell	·	·	·	—	·	·	·	·	·	·
Deslongchamps	·	·	·	·	·	·	—	·	·	·
a, Quenstedt	·	·	·	·	·	·	—	·	·	·
	×	×	×	×	×	×	×	×	×	×
ONITIDÆ	·	—	·	·	·	·	·	·	·	·
onites, Pander	·	—	·	·	·	·	·	·	·	·
	×	×	×	×	×	×	×	×	×	×
OMENIDÆ	—	—	—	—	—	—	—	·	·	·
a, Billings	—	—	·	·	·	·	·	·	·	·
Dalman	—	—	—	—	?	·	·	·	·	·
ophia, King	·	—	·	·	·	·	·	·	·	·
, Linné	·	—	·	·	·	·	·	·	·	·
rion, Shaler	·	—	·	·	·	·	·	·	·	·
donta, Hall	·	—	—	·	·	·	·	·	·	·
onites, Pander	·	—	?	?	?	·	·	·	·	·
lium, Hall	·	—	·	·	·	·	·	·	·	·
nena, Blainville	·	—	—	—	?	·	·	·	·	·
s, Dalman	·	—	—	—	—	—	—	·	·	·
hynchus, King	·	?	—	—	—	·	·	·	·	·
onyx, Vanuxem		?	—	?	?	·	·	·	·	·
, White & St. John	·	·	·	—	·	·	·	·	·	·
orhynchus, Dittmar	·	·	·	—	·	·	·	·	·	·
iclina, Laube	·	·	·	·	·	—	·	·	·	·
	×	×	×	×	×	×	×	×	×	×
TIDÆ	·	—	—	—	—	·	·	·	·	·
s, Fischer	·	—	—	—	—	·	·	·	·	·
lovia, King	·	·	—	—	—	·	·	·	·	·

***Table showing approximately the known distribution of the chief groups of Brachiopoda in geological time*—Continued.**

	Cambrian.	Silurian.	Devonian.	Carboniferous.	Permian.	Triassic.	Jurassic.	Cretaceous.	Tertiary.	Recent.
Productus, Sowerby	·	·	—	—	—	·	·	·	·	·
Productella, Hall	·	·	—	—	·	·	·	·	·	·
Aulosteges, Helmersen	·	·	·	·	—	·	·	·	·	·
	×	×	×	×	×	×	×	×	×	×
SIPHONOTRETIDÆ	—	—	·	·	·	·	·	·	·	·
Acrotreta, Kutorga	—	—	·	·	·	·	·	·	—	·
Siphonotreta, Vernouil	·	—	·	·	·	·	·	·	—	·
Mesotreta, Kutorga	·	—	·	·	·	·	·	·	—	·
Volborthia, Möller	·	—	·	·	·	·	·	·	—	·
	×	×	×	×	×	×	×	×	×	×
TRIMERELLIDÆ	·	—	·	·	·	·	·	·	—	·
Trimerella, Billings	·	—	·	·	·	·	·	·	—	·
Dinobolus, Hall	·	—	·	·	·	·	·	·	—	·
Monomerella, Billings	·	—	·	·	·	·	·	·	—	·
? *Lingulops*, Hall	·	—	·	·	·	·	·	·	—	·
	×	×	×	×	×	×	×	×	×	×
OBOLIDÆ	—	—	·	·	·	·	·	·	—	·
Spondylobolus, M'Coy	—	—	·	·	·	·	·	·	—	·
Monobolina, Salter	—	—	·	·	·	·	·	·	—	·
Kutorgina, Billings	—	—	·	·	·	·	·	·	—	·
Obolella, Billings	—	—	·	·	·	·	·	·	—	·

g approximately the known distribution of the chief groups of Brachiopoda in geological time—Continued.

	Cambrian.	Silurian.	Devonian.	Carboniferous.	Permian.	Triassic.	Jurassic.	Cretaceous.	Tertiary.	Recent.
pe	·	—	·	·	·	·	·	·	·	·
D'Orbigny	·	·	·	·	·	·	—	—	·	·
rok	·	·	·	·	·	·	?	?	—	—
	×	×	×	×	×	×	×	×	×	×
	·	—	—	—	—	—	—	—	—	—
r, M'Coy	·	—	—	·	·	·	·	·	·	·
ıs	·	?	—	—	—	—	—	—	—	—
chauroth	·		·	·	—	·	·	·	·	·
l	·	·	·	·	·	·	—	·	·	·
ı, Dall	·	·	·	·	·	·	·	—	·	·

Table of the geological distribution of the known families.

	Cambrian.	Silurian.	Devonian.	Carboniferous.	Permian.	Triassic.	Jurassic.	Cretaceous.	Tertiary.	Recent.
LYOPOMATA.										
	·	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—
	·	—	·	·	·	·	·	·	·	·
e	—	—	·	·	·	·	·	·	·	·
	—	—	·	·	·	·	·	·	·	·
RTHROPOMATA.										
æ	—	—	—	—	—	—	—	·	·	·
	·	—	—	—	—	·	·	·	·	·
	·	—	—	—	—	—	—	·	·	·
	·	—	—	?	?	·	·	·	·	·
	·	—	—	—	—	·	·	·	·	·
læ	·	—	—	—	—	—	—	—	—	—
æ	·	—	·	·	·	·	·	·	·	·
	·	—	—	—	—	—	—	—	—	—
idæ	·	·	—	·	·	·	·	·	·	·
	·	·	·	?	?	—	—	—	—	—

It is seen that of sixteen families, six have living representatives, one more than appear to have been represented during the Cambrian epoch; while but two of the Cambrian families have survived. All those living in Cretaceous times have endured till now. All now living had Paleozoic representatives, while half the Paleozoic families do not appear to have survived the changes which introduced the Mesozoic time.

Department of the Interior.

U. S. NATIONAL MUSEUM.

— 9 —

BULLETIN

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ADVERTISEMENT.

This work is the ninth of a series of papers intended to illustrate the collections of natural history and ethnology belonging to the United States and constituting the National Museum, of which the Smithsonian Institution was placed in charge by the act of Congress of August 10, 1846.

It has been prepared at the request of the Institution, and printed by authority of the honorable Secretary of the Interior.

JOSEPH HENRY,

Secretary of the Smithsonian Institution.

CONTRIBUTIONS

TO

NORTH AMERICAN ICHTHYOLOGY.

BASED PRIMARILY ON THE

COLLECTIONS OF THE UNITED STATES NATIONAL MUSEUM.

I.

REVIEW OF RAFINESQUE'S MEMOIRS ON NORTH AMERICAN FISHES.

BY

DAVID S. JORDAN.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1877.

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PREFACE.

The purpose of this paper is to present a series of identifications of the species of fresh-water fishes described by Rafinesque in his "Ichthyologia Ohiensis" and elsewhere, made as a result of nearly three years of "field-work" in the region fished in by Rafinesque. In most cases, fresh specimens have been carefully compared with Rafinesque's accounts, and in the more difficult groups, as the *Cyprinidæ*, *Catostomidæ*, and *Centrarchidæ*, I have taken a full series of the species known to occur in this region and compared Rafinesque's description with each specimen in turn, until one was reached which showed no serious discrepancy.

It is evident that many of Rafinesque's descriptions were drawn up from memory, and that his measurements were made by the eye, without the restraint of a tape-line. He indeed somewhere states that his collections were made in the summer and accounts written up for publication during the winter. As a result of this, the descriptions are often inexact, although usually striking. The numerous misprints in his work are also, in some cases, a source of confusion.

By making due allowance for these facts, and keeping in mind the proposition, unjustly controverted by some writers, that Rafinesque was not altogether a knave nor a fool, I have succeeded in identifying more or less satisfactorily, nearly all of his species, and in restoring to a number of his names their rightful priority.

The species still remaining unidentified are of two sorts: First, species really existing but not distinctively described, as *Luxilus interruptus*, *Rutilus compressus*, etc., in which no really tangible characters are given; and, second, those like *Aplocentrus calliops* and *Pogostoma leucops*, described at second hand from "drawings by Mr. Audubon", presenting, a grouping of characters applicable to no known fish.

It is not my purpose here to enter into any discussion of the merits of Rafinesque's work. That the Ichthyologia has been, and still is, a stumbling-block, is generally admitted. This is partly owing to errors of observation on the part of the author, partly to the admixture of statements derived from memory, imagination, or hearsay with statements of fact, and, finally, in no slight degree to the fact that Rafinesque's

accounts were taken from living fishes, and hence were not to be readily interpreted by workers in the closet with preserved specimens.

In order to do justice to Rafinesque's work, it is necessary, in the words of Girard (Proc. Ac. Nat. Sc. Phil. 1856, 167), "that one should go to the very ground trodden by Rafinesque himself, his book in hand, during all seasons of the year, aye, even for years in succession, to enable us to discriminate between what Rafinesque really observed and what is imaginary".

Rafinesque's work has been well summed up by Professor Agassiz:

"Nothing is more to be regretted for the progress of natural history in this country than that Rafinesque did not put up somewhere a collection of all the genera and species he had established, with well-authenticated labels, or that his contemporaries did not follow in his steps, or at least preserve the tradition of his doings, instead of decrying him and appealing to foreign authority against him. Tracing his course as a naturalist during his residence in this country, it is plain that he alarmed those with whom he had intercourse, by his innovations, and that they preferred to lean upon the authority of the great naturalists of the age, then residing in Europe, who, however, knew little of the special natural history of this country, than to trust a somewhat hasty man who was living among them, and who had collected a vast amount of information from all parts of the States, upon a variety of objects then entirely new to science. From what I can learn of Rafinesque, I am satisfied that he was a better man than he appeared. His misfortune was his prurient desire for novelties and his rashness in

The work known as the "Ichthyologia Ohiensis" was originally published as a serial in the "Western Review and Miscellaneous Magazine", Lexington, Ky., from December, 1819, to November, 1820. This fact of publication by parts should be kept in mind, as, in one case at least (that of *Aplesion*), it may affect our nomenclature.

The following are the dates of publication, for which I am indebted to Professor Gill:

Vol.	No.	Date.	W. R. & M. M.	I. O.
			Page.	*Page.*
I.	I.	December, 1819	305–313	1–13
	II.	January, 1820	361–377	13–29
	III.	February (?), 1820	?–57	?–37
II.	IV.	April, 1820	169–177	37–45
	V.	May, 1820	?–243	45–53
	VI.	June, 1820	299–307	53–60
	VII.	July, 1820	355–363	61–69
III.	VIII.	October, 1820	165–173	69–77
	IX.	November, 1820	244–252	77–84

Quite a number of genera and species of American fresh-water fishes were described by Rafinesque in other publications previous to the appearance of the Ichthyologia. I give a list of all these known to me, with identifications. I exclude all names merely catalogued without explanation, as having no claims upon our attention. In some cases, a species was catalogued under one name and finally described under some other.

I have next inserted a complete catalogue of Rafinesquian genera, arranged in chronological order, with their equivalents in the nomenclature which I at present adopt.

The body of this paper consists of a list of the genera, subgenera, and species of the Ichthyologia, arranged in the sequence adopted by Rafinesque, with the names, English, Latin, and French, as he gave them, the misprints corrected by him in the "Errata" being here rectified. The page in the Ichthyologia in which each description occurs is added for the benefit of compilers of synonymy. Next comes my identification, with a partial synonymy of the species, the name which I adopt being printed in capitals. In a subsequent paper on the fishes of the Ohio Basin, the synonymy will be given in full, for which reason I have preferred not to insert it here.

In all cases where the recognition of Rafinesque's genera or species will render necessary a change in the current nomenclature, I have added Rafinesque's description as a foot-note, that the reader may see the grounds on which the identification is based. In such cases, I have usually italicized the salient points.

Finally, a list of the species now found in the valley of the Ohio, which do not appear to have been known to Rafinesque, completes the memoir.

This paper was originally prepared for the press in the spring of 1876. Most of the changes in nomenclature here discussed have been adopted by the author in different papers on fishes, and they have generally received the sanction of American workers in ichthyology. The manuscript of the paper has been since retouched, some untenable positions have been abandoned, and some further changes suggested by Professors Cope and Gill have been introduced.

I.—LIST OF RAFINESQUIAN GENERA AND SUBGENERA, WITH THEIR EQUIVALENTS IN THE ADOPTED NOMENCLATURE.

I give here a catalogue in chronological order of the generic and subgeneric names proposed by Rafinesque for our fresh-water fishes, with the type of each where any type is either designated or in any definite way implied, with its equivalence in the nomenclature which the writer at present adopts. The reasons for the use or non-use of these names will appear farther on. Those names originally proposed for subgenera are designated by a star (*).

Rafinesquian genera.	Type species.	Modern genera.
	1818.	
Notropis	atherinoides.	Nototropis (=*Minnilus* =*Alburnellus*).
Glossodon	harengoides.	Hyodon.
Litholepis	adamantinus.	Litholepis (*Atractosteus*).
Dinoctus	truncatus.	Acipenser L.
Pogostoma	leucops.	A myth!
Pomoxis	annularis.	Pomoxys.
Noturus	flavus.	Noturus.
Sarchirus	vittatus.	Lepidosteus.
Exoglossum	lesurianum.	Exoglossum.
Maxillingua*	lesurianum.	Exoglossum.
Hypentelium*	macropterum.	Hypentelium (*Hylomyzon* Ag.).
	1819.	
Aplodinotus	grunniens.	Haploidonotus.
Etheostoma	flabellaris.	Etheostoma (*Catonotus*).
Leucops	leucops.	A myth!
Aplocentrus	calliops.	A myth!
Calliurus	punctulatus.	Micropterus.
Lepomis	auritus L.	Lepiopomus.
Pomotis*	auritus L.	Lepiopomus.

Rafinesquian genera.	Type species.	Modern genera.
Apomotis *	cyanellus.	Apomotis.
Notemigonus	auratus.	Notemigonus (*Stilbe*
Amphiodon	"alveoides" (alosoides).	Hyodon.
Amblodon	bubalus (teeth of *grun-niens*).	Ichthyobus and Ha[illegible] donotus.
Cycleptus	nigrescens.	Cycleptus.
Pylodictis	limosus.	Pelodichthys (*Hopl lus*).
	1820.	
Stizostedion *	salmonea.	Stizostethium
Lepibema *	chrysops.	Roccus Mitchill, 181
Pomacampsis *	nigropunctata.	Stizostethium.
Icthelis	auritus L.	Lepiopomus.
Telipomis *	———	Apomotis (*Bryttus* & V.).
Aplites *	pallida.	Micropterus Lac.
Nemocampsis *	flexuolaris.	Micropterus Lac.
Dioplites *	salmonea.	Micropterus Lac.
Ambloplites *	ictheloides.	Ambloplites.
Aplesion *	calliura.	Micropterus Lacép.
Diplesion *	blennioides.	Diplesium (*Hyos* Ag., 1854).

[redacted]

Rafinesquian genera.	Type species.	Modern genera.
Chrosomus	erythrogaster.	Chrosomus.
Semotilus	dorsalis.	Semotilus.
Rutilus	rutilus L. (European).	Leuciscus Klein, 17—.
Plargyrus	rutilus L.	Leuciscus.
Pimephales	promelas.	Pimephales.
Moxostoma *	anisurus.	Myxostoma (*Ptychostomus*).
Ictiobus *	bubalus.	Ichthyobus.
Carpiodes *	———	Carpiodes.
Teretulus *	———	Myxostoma.
Eurystomus *	megastomus.	? A myth.
Decactylus *	———	Catostomus, etc.
Cycleptus	nigrescens.	Cycleptus.
Ictalurus *	———	Ichthælurus.
Elliops *	maculatus.	Ichthælurus.
Ameiurus *	———	Amiurus.
Ilictis *	limosus.	Pelodichthys.
Leptops *	viscosus.	Pelodichthys.
Opladelus *	nebulosus.	Pelodichthys.
Picorellus *	vittatus.	Esox.
Cylindrosteus *	platostomus.	Lepidosteus.
Atractosteus *	ferox.	Litholepis, 1818.
Sturio *	———	Acipenser L.
Sterletus *	serotinus.	Acipenser L.
Dinectus	truncatus.	Acipenser L.
Pegedictis	ictalops.	Etheostoma (*Catonotus*).
Proceros	maculatus.	A myth.

II.—LIST OF SPECIES DESCRIBED PRIOR TO THE ICHTHYOLOGIA OHIENSIS.

I give here a list of the papers known to me in which descriptions by Rafinesque, prior to those in the Ichthyologia, occur, with the names of the species so described, the page on which the descriptions occur, and my identification of the species.

* I. "Précis des Découvertes Somiologiques", 1814:

Sparus mocasinus	19=Eupomotis aureus (Walb.) G. & J.
Centropomus albus	19=Morone americana (Gmel.) Gill.
Centropomus luteus	19=Perca americana Schranck.

II. Dissertation on Water Snakes, Sea Snakes and Sea Serpents. <American Monthly Magazine and Critical Review, September, 1817:

Anguilla gigas	434=A myth.

III. First Decade of new North American Fishes. <American Monthly Magazine and Critical Review, December, 1817:

Anguilla chrisypa.....	120=Anguilla vulgaris Fleming.
Salmo pallidus	120=Salmo namaycush Bloch.
Bodianus rupestris....	120=Ambloplites rupestris (Raf.) Gill.
Bodianus achigan.....	120=Micropterus salmoides (Lac.) Gill.
Cyprinus bullaris.....	120=Leucosomus bullaris (Raf.) Jor. (*Semotilus argenteus* Auct.)
Cyprinus hemiplus....	121=Notemigonus americanus (L.) Jor.
Cyprinus vittatus.....	121=Rhinichthys atronasus (Mit.) Ag.
Cyprinus megalops....	121=Luxilus cornutus (Mit.) Jor.
Cyprinus melanurus...	121=Luxilus cornutus (Mit.) Jor.

IV. Description of two new Genera of North American Fishes, Opsa-

[redacted]

Discoveries in Natural History, made during a Journey through the Vestern Region of the United States by Constantine Samuel Rafinesue, esq. Addressed to Samuel L. Mitchill, President, and other iembers of the Lyceum of Natural History in a letter dated at Louisille, Falls of the Ohio, 20th July, 1818. <American Monthly Magaine and Critical Review, September, 1818. *(Twenty-six species reorded, the following described at some length:)

Glossodon harengoides. 354=Hyodon tergisus Le Sueur.
Glossodon heterurus... 354=Hyodon tergisus Le Sueur.
Perca salmonea..... 354=Stizostethium salmoneum Raf.
Sciæna caprodes..... 354=Percina caprodes (Raf.) Grd.
Silurus punctatus..... 354=Ichthælurus punctatus (Raf.) Jor.
Silurus olivaris.. .... 354=Pelodichthys olivaris (Raf.) Gill & Jor.
Catostomus bubalus... 354=Ichthyobus bubalus Raf.
Catostomus erythrurus. 354=Myxostoma duquesnii (Le S.) Jor.
Clupea heterurus..... 354=Dorysoma cepediana heterura (Raf.) Jor.

The following is the catalogue as given in this paper:

Perca salmonea	Salmon.
Perca chrysops	Rockfish.
Sciæna grunniens	White Perch.
Sciæna caprodes	Hog Fish.
Bodianus calliurus	Bass.
Sparus cyanelus	Sun Fish.
Sparus nigropunctatus	Bachelor Perch.
Silurus punctatus	Mud Cat Fish.
Silurus olivaris	Yellow Cat Fish.
Silurus amblodon	Black Cat Fish.
Catostomus bubalus	Buffaloe Fish.
Catostomus erythrurus	Red Horse.
Catostomus macropterus	Carp.
Catostomus duquesnei	Sucker.
Clupea heterurus	Gizzard.
Clupea alosoides	Shad.
Glossodon harengoides	Spring Herring.
Glossodon heterurus	Summer Herring.
Hydrargyra dinema	Minny.
Hydrargyra notata	Chub.
Hydrargyra amblops	White Chub.
Lepisosteus fluviatilis	Gar Fish.
Polyodon folium	Shovel Fish.
Polyodon pristis	Spade Fish.
Acipenser platorynchus	Sturgeon.
Silurus pallidus	White Cat.

Not seen yet: Pike, Eels, Lamprey, Black Perch, Yellow Perch, Red Perch.

VII. Further discoveries in Natural History, made during a journey through the Western Region of the United States, by Constantine Samuel Rafinesque, esq. <American Monthly Magazine and Critical Review, October, p. 445. (Describes new genera *Litholepis*, *Dinoctus* and *Pogostoma*, and mentions without description the typical species of each.)

Twenty-two species are catalogued and three species are described, as follows:*

Anguilla laticauda	445=Anguilla vulgaris Fleming.
Esox vittatus	445=Unidentified.
Bodianus calliops.....	445=A myth.

VIII. Further account of Discoveries in Natural History in the Western States, by Constantine Samuel Rafinesque, esq. Communicated in a letter from that gentleman to the editor, Lexington, October 5, 1818. <American Monthly Magazine and Critical Review, November, 1818. (Three new genera described and the typical species of each:)

Pomoxis annularis.....	41=Pomoxys annularis.
Noturus flavus	41=Noturus flavus Raf.
Sarchirus vittatus.....	41=Lepidosteus osseus (L.) Ag.

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* The following are the species added to the catalogue in this paper:

Lepisosteus platostomus.....	Alligator Fish.
Lepisosteus stenorhynchus.....	Gar Fish.

Description of three new Genera of Fluviatile Fish, Pomoxis, Sarchirus, and Exoglossum. <Journal of Philadelphia Academy of Natural Sciences, November, 1818.

Pomoxis annularis..... 417=Pomoxys annularis Raf.
Sarchirus vittatus .... 419=Lepidosteus osseus (Lac.) Ag. (juv.)
Exoglossum macropterum ..... 420=Hypentelium nigricans (Le S.) Jor.
Exoglossum annulatum 421=Exoglossum maxillingua (Le S.) Hald.
Exoglossum nigrescens. 422=Exoglossum maxillingua.
Exoglossum lesurianum. 420=Exoglossum maxillingua.

Description of a new Genus of Fresh-Water Fish, Exoglossum. <Silliman's American Journal of Science and Arts, 1819.

Exoglossum vittatum .. 156=Exoglossum maxillingua.
Exoglossum annulatum. 156=Exoglossum maxillingua.

Prodrome de 70 nouveaux Genres d'Animaux découverts dans l'intérieur des États-Unis d'Amérique durant l'année 1818. <Journal Physique, de Chymie et d'Histoire Naturelle, June, 1819.

Aplodinotus grunniens. 419=Haploidonotus grunniens Raf.
Etheostoma flabellaris.. 419=Etheostoma flabellaris Raf. (*Catonotus* Ag.).
Etheostoma caprodes... 419=Percina caprodes (Raf.) Grd.
Etheostoma blennioides. 419=Diplesium blennioides (Raf.) Jor.
Pogostoma leucops..... 419=A myth!
Aplocentrus calliops... 420=A myth!
Calliurus punctulatus.. 420=Micropterus salmoides (Lac.) Gill.
Lepomis cyanellus .... 420=Apomotis cyanellus (Raf.) Cope & Jor. (*Bryttus mincopas* Cope).
Lepomis macrochirus .. 420=Lepiopomus macrochirus Raf. (*nephelus* Cope).
Notemigonus auratus... 421=Notemigonus americanus (Lac.) Jor.
Amphiodon alveoides.. 421=Hyodon tergisus Le S.
Amblodon bubalus..... 421=Ichthyobus bubalus (Raf.) Ag. (in part).
Amblodon niger..... 421=Bubalichthys niger (Raf.) Ag.

Cycleptus nigrescens...	421=Cycleptus elongatus (Le S.) Ag.
Noturus luteus.....	421=Noturus flavus Raf.
Pilodictis limosus.....	422=Pelodichthys olivaris (Raf.) Gill & Jor.
Litholepis adamantinus.	422=Litholepis spatula (Lac.) Jor.

XII. Description of the Silures or Cat-Fishes of the River Ohio, by C. S. Rafinesque, Professor of Botany in the Transylvania University of Lexington, Kentucky. <Quarterly Journal of Science, Literature and Arts, Royal Institution, London, 1820, ix.

Silurus maculatus.. ...	48=Ichthælurus punctatus (Raf.) Jor.
var. erythroptera.....	49=Ichthælurus punctatus (Raf.) Jor.
Silurus pallidus	49=Ichthælurus punctatus.
var. marginatus	49=Ichthælurus punctatus.
var. lateralis	49=Ichthælurus punctatus.
var. leucoptera.....	49=Ichthælurus punctatus.
Silurus cerulescens.....	49=Ichthælurus punctatus.
var. melanurus.....	49=Ichthælurus punctatus.
Silurus argentinus.....	50=Ichthælurus punctatus.
Silurus nebulosus.....	50=Pelodichthys olivaris (Raf.) G. & J.
Silurus viscosus.....	50=Pelodichthys olivaris.
Silurus lividus.....	51=Amiurus lividus (Raf.) Jor.
var. fuscatus.....	51=Amiurus lividus.
Silurus melas.....	51=Amiurus melas (Raf.) Jor. & Cope-

cinnati, &c., &c. | — | The art of seeing well, or of noticing and distinguishing with accuracy the objects which we perceive is a high faculty of the mind, unfolded in few individuals, and despised by those who can neither acquire it, nor appreciate its results | — | Lexington, Kentucky | printed for the Author by W. G. Hunt (price one dollar). | — | 1820 | (1 vol., 8vo, 90 pp.)

On the reverse of the title-page:

These Pages | and the Discoveries which they contain | in one of the principal Branches | of Natural History, | are respectfully Inscribed | by the Author | To his fellow-labourers in the same field of Science | Prof. Samuel L. Mitchill, M. D. | who has described the Atlantic Fishes of New York, | and to | C. A. Le Sueur, | who was the first to explore the Ichthyology of the Great American Lakes, &c. | In Token | of Friendship, Respect, and Congratulation.

I. Genus, PERCH, PERCA, Perche. (p. 20.)

1st species, Salmon-Perch, PERCA SALMONEA, Perche Saumone. (p. 21.)

STIZOSTETHIUM SALMONEUM Raf., Cope, etc.

A fair description, as Professor Cope has shown. This fish is probably distinct from *S. vitreum*, although the two species are closely related. On page 23, Rafinesque suggests that *P. salmonea* forms a peculiar subgenus or genus which may be called *Stizostedion*. This name antedates *Lucioperca* of Cuvier, and has been generally adopted by recent American authors.

2d species, Golden-Eyes Perch, PERCA CHRYSOPS, Perche-œuil-d'or. (p. 22.)

ROCCUS CHRYSOPS (Raf.) Gill.

Description not quite accurate but recognizable. On page 23 the subgeneric name of *Lepibema* is proposed for it, but *Roccus* of Mitchill is older. *Lepibema* may be retained as the name of a subgenus of *Roccus*, the body being shorter and deeper and the dentition somewhat different.

3d species, Black-dotted Perch, PERCA NIGROPUNCTATA, Perche a points-noirs. (p. 23.)

An unrecognizable description, based, as nearly all of Rafinesque's worst descriptions are, "on a drawing" of Mr. Audubon. The original may have been *Percina caprodes*, *Stizostethium canadense*, or nothing. Rafinesque proposes for it the generic name of *Pomacampsis*.

II. Genus, BUBBLER, AMBLODON, Amblodon. (p. 24.)

= *Aplodinotus* Rafinesque, 1819.
= *Haploidonotus* Gill, 1861.

4th species, Grunting Bubbler, AMBLODON GRUNNIENS, Amblodon grognant. (p. 24.)

HAPLOIDONOTUS GRUNNIENS Raf.

Corvina oscula Cuv. & Val., 1830.
Corvina grisea Dekay, 1842.
Amblodon grunniens Agassiz, 1854.

A very good description.

III. Genus, PAINTED TAIL, Calliure. (p. 26.)

Micropterus Lacépède, not *Calliurus* Agassiz, Girard, etc. = *Chænobryttus* Gill.

5th species, Dotted Painted Tail, CALLIURUS PUNCTULATUS, Calliure pointille.

MICROPTERUS SALMOIDES (Lacép.) Gill.

The peculiar coloration of the caudal fin which suggested the name *Calliurus*, "base yellow, middle blackish, tip white", belongs among Ohio fishes only to the young of the Black Bass. *Calliurus*, therefore, as shown by Professor Gill, is a synonym of *Micropterus*, and cannot be applied to a distinct genus.

IV. Genus, SUNFISH, ICTHELIS, Icthele. (p. 27.)

=LEPOMIS Raf., 1819.

1st subgenus, TELIPOMIS. (p. 27.)

=APOMOTIS Raf., 1819=Bryttus C. & V., 1831.

***6th species, Gilded Sunfish, ICTHELIS MACROCHIRA, Icthele macrochire.** (p. 27.)

LEPIOPOMUS MACROCHIRUS Raf.

Lepomis nephelus Cope.

This description applies perfectly to *Lepomis nephelus* Cope, a rather

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* Body oval, oblong, *gilt, crowded* with *small brown dotts;* head *small*, scaly, opercule flexuose, spot *narrow, marginal*, and *black; jaws equal;* tail forked; *pectoral fins long and narrow, reaching the anal fin*, which has 13 rays, whereof 3 are spiny.

A *pretty* species from three to four inches long. In the Ohio, Green River, Wabash, &c. Names, Sun-fish, Gold-fish, &c. Head *rather acute*, not scaly before the eyes. Iris gilt brown. Dorsal fin with 22 *long* rays, whereof 11 are spiny; a depression between the two sorts of rays. Anal fin broad and rounded. Tail 20 rays. Thoracic 1 and 5. Pectoral 15. Diameter of the body nearly one-fourth of total length (with caudal).

common species in Southern Ohio and Indiana. *Pomotis macrochira* Kirtland is based, in part at least, on *Lepomis pallidus* (Mitch.). *Ichthelis macrochira* Jordan (Man. Vert.) is a *Xenotis*, to which I have since given the name of *X. aureolus*.

* **7th species, Blue Sunfish, ICTHELIS CYANELLA, Icthele bleuatre.**

APOMOTIS CYANELLUS Raf.

Bryttus punctatus Cuv. & Val.
Calliurus longulus Girard.
Calliurus formosus Girard.
Calliurus longulus Bliss (*in lit.*—specimens identified).
Chænobryttus mineopas Cope.
Icthelis melanops Raf. (*Chænobryttus melanops* Cope, not of Gill.)

Rafinesque's description, although erroneous in one or two particulars, refers to a species of *Apomotis*, and the name *cyanella* has priority over all others. As in nearly every case the "diameter" is made too small; evidently Rafinesque trusted his eyes in such cases instead of a tape-line.

† **8th species, Black-Eye Sunfish, ICTHELIS MELANOPS, Icthele æuil-noir.**

APOMOTIS CYANELLUS Raf.

Description somewhat erroneous, but characteristic.

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* Body *elliptical, elongate*, diameter one-fifth, *olivaceous gilt, crowded* with irregular *blue dotts; brownish above; head elongate, lower jaw longer, cheeks with blue flexuose lines; spot oblong, blackish, nearly marginal;* tail rounded, notched; anal fin very broad with 12 rays, whereof three are short spiny; pectoral fins very short.

A small species hardly three inches, called Blue-fish or Sun-fish. I found it on the Ohio at the falls. *Appearing entirely blue at a distance.* Head brown above; iris gilt; opercle curved; tail olive-blue with 24 rays. Dorsal fin brownish with 20 rays, whereof 10 are spiny, hardly any middle depression. Pectorals small trapezoidal, 12 rays. Thoracic one and five.

† *Body oblong, diameter one-fourth, olivaceous, covered with blue dotts,* neck brown above, head large, mouth *rather large*, upper jaw longer; *opercule with blue curved and longitudinal* lines beneath; spot *rounded, black at its* base; fins olivaceous, tail bilobed; anal fin with three and nine rays; pectoral fins large oboval.

Length from 2 to 6 inches; common in the tributary streams of the Ohio, the Kentucky, Licking, Miami, &c., and even in small creeks. Vulgar names, Blue-fish, Black-eyes, Sun-fish, Blue-bass, &c. It has black eyes (pupils) like all the other species, but the iris is black also, with a silvery hue or ring. Dorsal fin with 10 and 10 rays, *the spiny ones very short.* Caudal 20. Pectoral 16. Thoracic 1 and 5 as usual, but the spiny ray is very short, as are also those of the anal fin.

2d subgenus, POMOTIS. (p. 28.)

9th species, Red-Eye Sunfish, ICTHELIS ERYTHROPS, Icthele œuil-rouge. (p. 29.)

AMPLOPLITES RUPESTRIS (Raf.) Gill.

Bodianus rupestris Rafinesque, 1818.

Description fair. The name *Pomotis*, first proposed in 1819, is a mere synonym of *Lepomis*.

*** 10th species, Eared Sunfish, ICTHELIS AURITA, Icthele oreilleuse.**

XENOTIS LYTHROCHLORIS Jordan. *nom. sp. nov.*

Not *Pomotis auritus* ("L.") Günther.

= *Lepomis auritus* Cope. (Not of Raf. 1818.)

11th species, Big-Ear Sunfish, ICTHELIS MEGALOTIS, † Icthele megalote. (p. 29.)

XENOTIS MEGALOTIS (Raf.) Jordan.

Pomotis nitidus Kirtland.

Not *Ichthelis incisor* (C. & V.) Holbr.

Not *Lepomis megalotis* Cope.

Ichthelis megalotis Raf., Bliss (*in lit.*).

Description pretty good. This cannot be the *Lepiopomus pallidus* (*incisor*), as has been supposed by Professor Cope.

V. Genus, RIVER-BASS, LEPOMIS, Lepome. (p. 30.)

= *Micropterus* Lacépède.

Not *Lepomis* Raf., 1819.

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* Body *oval elliptic* (diameter one-third), *olivaceous with blue and rufous dots;* head small, jaws equal, opercule flexuose, appendage *black, broad and truncate, some blue flexuose lines on the side of the head;* tail brownish lunulate; back brownish; anal fin 3 and 9; pectorals not reaching the vent. Thoracics mucronate.

Length from 3 to 12 inches; common in the rivers, creeks, and ponds of Kentucky. Vulgar name, Sunfish. Iris brown. Dorsal fin brownish, 10 and 10, *spiny rays shorter*, thoracic fins very long; spiny rays rather shorter, first soft ray mucronate; pectorals nearly rhomboidal with 14 rays, tail 16 rays.

† Body oval, rounded (diameter two-fifths), *chestnut color with blue dots, belly red;* head large, lower jaw longer, *opercule with blue flexuose lines, appendage black, very large elliptic*, end rounded; tail black, slightly forked, pectoral large, reaching the vent; anal fin 3 and 9; thoracics long and mucronate; black tail.

A fine species, called Red-belly, Black-ears, Black-tail Sun-fish, &c. It lives in the Kentucky, Licking, and Sandy Rivers, &c. Length from 4 to 8 inches. *Head very sloping*, iris silvery brown, *belly of a bright copper red color.* All the *fins black* except the pectorals, which are olivaceous, trapezoidal, acute and large. The dorsal has 20 rays, whereof 9 *short* ones are spiny. *Body very short, hardly as long as broad, if the head and tail are deducted.* Thoracics like those of the foregoing species.

1st subgenus, APLITES. (p. 30.)

12th species, Pale River-Bass, LEPOMIS PALLIDA, Lepome pale. (p. 30.)

MICROPTERUS PALLIDUS (Raf.) Gill & Jordan.

(Young; "length 6 to 12 inches".)
= *Micropterus nigricans* (C. & V.) Gill.
= *M. floridanus* (Le S.) Goode.

13th species, Streaked-Cheeks, River-Bass, LEPOMIS TRIFASCIATA, Lepome trifasciee. (p. 31.)

MICROPTERUS SALMOIDES (Lac.) Gill. ("Over a foot in length".)

14th species, Brown River-Bass, LEPOMIS FLEXUOLARIS, Lepome flexueux. (p. 31.)

MICROPTERUS SALMOIDES. (Adult; "reaching the length of 2 feet".)

This is made to form another subgenus, *Nemocampsis*.

2d Subgenus, DIOPLITES. (p. 32.)

15th species, Trout River-Bass, LEPOMIS SALMONEA, Lepome saumone. (p. 32.)

MICROPTERUS SALMOIDES. ("Length 6 to 24 inches".)

16th species, Spotted River-Bass, LEPOMIS NOTATA, Lepome tache. (p. 32.)

MICROPTERUS SALMOIDES. ("3 to 8 inches long".)

17th species, Sunfish River-Bass, LEPOMIS ICTHELOIDES, Lepome ictheloide. (p. 32.)

Ambloplites ichtheloides Ag.

AMBLOPLITES RUPESTRIS (Raf.) Gill.

This is made to "almost form a peculiar subgenus", termed *Ambloplites*.

VI. Genus, POMOXIS, POMOXIS, Pomoxe. (p. 33.)

= *Pomoxis* Agassiz.

18th species, Gold-Ring Pomoxis, POMOXIS ANNULARIS, Pomoxe annulaire. (p. 33.)

POMOXYS ANNULARIS Raf.

Cichla storeria Kirtland.
Pomoxys storerius, *intermedius*, *protacanthus*, and *brevicauda* Gill.

Description not entirely accurate, but certainly sufficient for identification. This fish is now, as in Rafinesque's time, abundant at the Falls of the Ohio, where it is now called "Bachelor". Throughout Kentucky it is known as the "New Light", and sometimes as "Campbellite". The characters assumed to distinguish *intermedius*, *protacanthus*, etc., are entirely within the bounds of individual variation.

VII. Genus, RED-EYE, APLOCENTRUS, Aplocentre. (p. 31.)

19th species, Ohio Red-Eye, APLOCENTRUS CALLIOPS, Aplocentre belœuil. (p. 31.)

A myth, described from a drawing by Mr. Audubon. Its charact[illegible]rs would indicate a sort of Sunfish with a dorsal fin resembling that of *Coryphæna*, "beginning behind the head with a single long, spiny r[illegible]y, and ending close to the tail".

The name "Red-Eye" in the region which this fish is supposed to [illegible] inhabit is chiefly applied to the Rock-Bass (*Ambloplites rupestris*).

VIII. Genus, BARBOT, POGOSTOMA, Barbotte. (p. 34.)

20th species, White-Eyes Barbot, POGOSTOMA LEUCOPS, Barbo[illegible]tte œuilblanc. (p. 35.)

Another mythical species, "described from a drawing of Mr. Audubo[illegible]n". It is a toothless Sunfish, with two small distant dorsal fins, and six b[illegible]ar-bels about the mouth. Whatever it is, it has probably no longer "[illegible] a great many vulgar names, such as White-Eyes, Spectacles-Fish, Streak[illegible]ed Sunfish, Black Sunfish, Barbot, Bearded Sunfish, etc.". Nor do t[illegible]he French settlers call it "Barbotte, Poisson Lunette, and Œuil-Blanc[illegible]c". There is no sort of foundation for Professor Agassiz's assertion th[illegible]at "*Pogostoma* is evidently synonymous with *Lota*".

IX. Genus, HOGFISH, ETHEOSTOMA, Etheostome. (p. 35.)

=*Pegedictis* Raf., 1820.
=*Catonotus* Ag., 1854.
=*Etheostoma* Gill. & Jordan emend., 1877.

1st subgenus, APLESION. (p. 36.)

= MICROPTERUS Lacépède.

21st species, Bass Hogfish, ETHEOSTOMA CALLIURA, Etheostom[illegible]e calliure. (p. 36.)

MICROPTERUS SALMOIDES. (Young, 3 to 9 inches long.)

"It has some similarity with the *Lepomis flexuolaris*, and some othe[illegible]r River-Bass".—(Raf.)

22nd species, Fantail Hogfish, ETHEOSTOMA FLABELLATA, Etheo[illegible]tome eventail. (p. 36.)

ETHEOSTOMA FLABELLARIS Raf.

Etheostoma flabellaris Raf., 1819.
Catonotus flabellatus Auct.

Description fair. The genus *Etheostoma* was based originally on thi[illegible]

species, *E. blennioides*, and *E. caprodes*. The original diagnosis was drawn from *E. flabellaris*, and the subsequent subtraction of the two latter as *Diplesium* leaves the name properly to be retained here.

***23d species, Black Hogfish, ETHEOSTOMA NIGRA, Etheostome noire.** (p. 37.)

BOLEOSOMA NIGRA (Raf.) Jordan.

Boleosoma maculatum Agassiz.
Boleosoma brevipinne Cope.

Not *Nothonotus maculatus* Agassiz.
Not *Pœcilichthys camurus* Cope.

Description not very good, but I have little hesitation in making the above identification, as the colors of the males of this species in spring are often so intense in life as to give the impression of a truly black fish. The small, dark spots, obvious on close inspection, may be readily overlooked.

The name *Aplesium* cannot be retained for this genus, as in the number of the Western Miscellaneous Mag. in which *Aplesion* was first proposed this species was not included.

I am now convinced that my previous identification of *Etheostoma nigra* with *Pœcilichthys camurus* Cope and *Etheostoma maculatum* Kirt. is erroneous.

†2d subgenus, DIPLESION. (p. 37.)

‡ 24th species, Blunt-Nose Hogfish, ETHEOSTOMA BLENNIOIDES, Etheostome blennioide. (p. 37.)

DIPLESIUM BLENNIOIDES Raf.

Etheostoma blennioides Kirtland (description but not figure), (not of Agassiz and late authors).
Pileoma cymatogramma Abbott.
Hyostoma cymatogrammum Cope.

Rafinesque's description cannot refer to the "*E. blennioides* Raf." of Agassiz and recent authors (=*Alvordius aspro* Cope and Jor.). The

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* Entirely *black*, pale beneath; scales smooth, *lateral line streight, mouth rather beneath, forehead rounded, upper jaw longer;* preopercule rounded, *spine acute;* vent rather anterior; tail entire nearly truncate.

From one to two inches long. Observed in Green River. Vulgar name Black Minny. Iris black, silvery, and small. Diameter one-seventh of the length, without spots. Head small. Pectoral fins oboval. Tail 20. *Anal fin* 2 *and* 8. *Dorsal* 10 *and* 12.

† Dorsal fin nearly double, divided into two joining parts. Meaning nearly double.

‡ Body elongate, breadth one-eighth of the length, *olivaceous, almost diaphanous, some brown spots on the back, and some brown geminate transversal lines across the lateral line,*

beautiful and singular coloration of that species—a chain of round confluent, black blotches on a yellowish ground—would surely have b noticed. Moreover, the pattern of color of Rafinesque's fish is exa that of a young "*Hyostoma cymatogrammum*". Furthermore, the cha ters "head small", "snout rounded", "mouth small, beneath", "che swelled", "dorsal 13 and 13", "a brown stripe upon it", etc., apply fectly to the "*Hyostoma*" and not to the "*Etheostoma*". In the stre where Rafinesque collected, I find the former species much the n abundant.

25th species, Common Hogfish, ETHEOSTOMA CAPRODES, Et tome capros. (p. 38.)

PERCINA CAPRODES (Raf.) Girard.

Description good.

X. Genus, GOLDSHAD, POMOLOBUS, Pomolobe. (p. 38.)

<*Alosa* of authors.
=*Pomolobus* Gill.

26th species, Ohio Goldshad, POMOLOBUS CHRYSOCHLORIS, lobe dore. (p. 39.)

POMOLOBUS CHRYSOCHLORIS Raf., Gill., and late authors.

Description good.

XI. Genus, GIZZARD, DOROSOMA, Dorosome. (p. 39.)

=*Chatoëssus* Cuvier and most authors.
=*Dorosoma* Gill.

[redacted] Gizzard, DOROSOMA NOTATA, Doroso

*XII. Genus, **GOLD HERRING, NOTEMIGONUS**, Notemigone. (p. 40.)

<*Abramis* Cuvier and many authors (not type).

=*Stilbe* Dekay (pre-occupied in botany).

=*Stilbius* Gill.

=*Luxilus* Girard (not of Rafinesque=*Hypsilepis*).

=*Leucosomus* Storer (not of Heckel).

=*Plargyrus* Putnam (not of Rafinesque, etc.).

† 28th species, Ohio Gold Herring, **NOTEMIGONUS AURATUS**, Notemigone dore. (p. 40.)

NOTEMIGONUS AMERICANUS (L.) Jordan.

Cyprinus americanus Linnæus.

Stilbe chrysoleuca (Mit.) Dek.

Stilbe americana (L.) Cope.

Abramis americanus (L.) Günther.

A very good description, correct in every particular. This fish is rarely or never called Shiner in the Ohio Basin, and it is very often considered by the fisherman as a Shad. If this genus be really distinct from the European *Abramis*, as its serrated teeth indicate, the generic name of *Notemigonus* must be adopted.

XIII. Genus, **FALSE HERRING, HYODON**, Hyodon. (p. 41.)

1st subgenus, **AMPHIODON**. (p. 41.)

29th species, Toothed False Herring, **HYODON AMPHIODON**, Do. (*sic.*) (p. 42.)

HYODON TERGISUS Le Sueur.

It is now generally conceded that there is but one species of *Hyodon*. I find some variation in form of body and number of fin-rays in specimens from different waters, but nothing indicating specific distinction. No author, so far as I know, has paid any attention to the numerous

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* Body fusiform, compressed, scaly. Vent posterior. Abdomen *obtusely carinated, not serrate; back similar before the dorsal fin.* Head scaleless, *mouth small, without teeth, lower jaw longer;* gill-cover double, operculc simple. Abdominal fins with nine rays and *no lateral appendage. Dorsal fin behind them above the vent.* This genus differs from *Clupea* by the carinated back and belly, *without serratures*, and the posterior dorsal. The name means back half angular. 14th G. of my Prodr. N. G. Animals.

† Back *gilt olivaceous, remainder gilt silvery;* fins yellow; lateral line following the curve of the belly; *dorsal with* 9 *rays, anal with* 12; tail equally forked.

Length from 4 to 8 inches, diameter one-fifth of the total length. Iris gilt. Tongue short, toothless. Scales large, radiating with nerves. Head convex above and small. Dorsal fin broad trapezoidal, the first ray longer. Anal broad also, but not so much. Pectoral small with 16 rays. Tail 24. Not uncommon in the Ohio, Kentucky, Miami, &c. The vulgar names are Gold Herring and Yellow Herring. It appears in the fall. It does not bite at the hook. Flesh pretty good.

species of Rafinesque. The name *Glossodon* was published by Rafinesque for this genus in September, 1818, within a few days of the publication of *Hiodon* by Le Sueur. It is not known which has priority, but as Le Sueur's paper was first *written*, and as his name has come into common use, it is probably best to retain it.

30th species, Summer False Herring, HYODON HETERURUS, Hyodon heterure. (p. 42.)

2d subgenus, GLOSSODON. (p. 42.)

31st species, Summer False Herring, HYODON VERNALIS, Hyodon printanier. (p. 43.)

3d subgenus, CLODALUS. (p. 43.)

32d species, May False Herring, HYODON CLODALUS, Hyodon de May. (p. 43.)

33d species, Lake False Herring, HYODON TERGISUS, Hyodon lacustre. (p. 43.)

XIV. Genus, TROUT SALMO, Truite. (p. 44.)

34th species, Alleghany Trout, SALMO ALLEGANIENSIS, Truite alleganienne. (p. 44.)

SALMO FONTINALIS Mitchill.

35th species, Black Trout, SALMO NIGRESCENS, Truite noiratre. (p. 45.)

SALMO FONTINALIS Mitchill.

***XV. Genus, MINNY, MINNILUS, Minny.** (p. 45.)

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* Body elongated, somewhat compressed, covered with small scales. Vent medial Head flat above, and somewhat shielded. Gill-cover double, scaleless, three branchial rays. Mouth diagonal, small, toothless and beardless, without lips, lower jaw shorter and narrower. A small trapezoidal dorsal fin, nearer to the head than to the tail, opposite to the abdominal fins, and without spines. Abdominal fins with eight rays, and without appendages. (Tail forked in all the Ohio species.)

There are in the United States more than fifty species of small fresh-water fishes (and in the Ohio waters more than sixteen species), commonly called Minnies, Minnows, Bait-fish, Chubs, and Shiners, which should belong to the genus *Cyprinus* of Linnæus, or, rather, to the part of it which has been called *Leuciscus* by Klein and Cuvier; which subgenus (or genus) is distinguished by a small dorsal fin, no spines nor beards; but as the genus *Cyprinus* forms now a large family, and even the genus *Leuciscus* must be divided, since it contains more than one hundred anomalous species, differing in the position of the dorsal fin and the vent, the number of rays to the abdominal fins, &c., I venture to propose this and the three following genera. Three other different genera might be established upon the European species, distinguished as follows:

Dobula. Dorsal fin nearer to the tail, abdominal fins with nine rays and an appendage; upper jaw longer.

Phoxinus differs by ten abdominal rays and no appendage.

Alburnus differs from *Dobula* by no appendage and the lower jaw longer.

Besides my genus *Hemiplus* (Annals of Nature), which has the vent posterior, the lower jaw longer, only five rays and an appendage to the abdominal fins.

All these small fish are permanent; they feed on worms, insects, univalve shells, and spawn; they bite at a small hook, baited with worms or flies, and they form an excellent bait for all the larger fish which feed upon them. They are good to eat when fried.

th species, SlenderMinny, **MINNILUS DINEMUS**, Minny emeraude.
)

NOTOTROPIS DINEMUS (Raf.) Jordan.

nellus jaculus Cope.

coloration and form are those of *Alburnellus jaculus*, with which e identified this description.

species, Spotted Minny, **MINNILUS NOTATUS**, Minny tache. (p. 47.)

HYBORHYNCHUS NOTATUS (Raf.) Ag.

rhynchus notatus Agassiz.
rhynchus superciliosus Cope.

assiz's identification of his *Hyborhynchus* with this species is possi- orrect, although the description is very irrelevant. The common *rhynchus* of the Ohio region has small but distinct barbels at the of the mouth, and is therefore *H. superciliosus* of Cope. The latter is probably a synonym of *H. notatus*.

th species, Little-Mouthed Minny, **MINNILUS MICROSTOMUS**, Minny stome. (p. 47.)

HYBOPSIS MICROSTOMUS (Raf.) Jordan.

psis longiceps Cope.
psis microstomus (Raf.) Jordan.

is description agrees very closely with specimens sent me by W. M.

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iameter *one-eighth* of total length, *silvery*, back *olivaceous with a brown longitudinal* in the middle; two lateral lines, one straight, the lower curved downwards and r; *head gilt and green above*. Dorsal fin 9 rays. *Anal fin* 12 *rays*.

mall and *slender* species, *common in the Ohio*, &c., and *going in flocks*; length 2 or hes. Its *head is beautiful when alive; it is above of a fine gold color with green shades, ing of an emerald-green above the eyes. Iris silvery*; sides opaque, upper lateral line green. Nostrils large. Pectoral fins with 12 rays, not reaching the abdominal. *s fins silvery*. Tail with 24 rays. Scales very small.

iameter one-seventh of total length, silvery, back olivaceous with a large brown in the middle; head brown above, lateral line straight, a black spot at the of the tail. Dorsal with 8, and anal with 9 rays.

ns size with the preceding, but not so slender, and less common. Iris golden, ils very large, mouth small, lateral line shining blue on the opaque sides. Pecto- ns with 12 rays, and not reaching the abdomen. Tail with 14 rays. It is often l Minny Chub.

iameter one-seventh of total length; *silvery, olivaceous on the back and head, sides few black dots*, lateral line straight, pectoral *fins reaching the abdominal fins*. Dorsal nal *fins with eight rays*.

mall species found in the Kentucky River. *Mouth very small*, nostrils large, iris y, fins fulvous, the pectoral with 12 and the caudal with 24 rays. *Head elongated*.

Linney from Salt River, Kentucky. An examination of Professor Cope's types of *Hybopsis longiceps* has convinced me of the identity of that species with Rafinesque's. It is perhaps best to unite *Hybopsis* with *Luxilus*. The distinctive character of the high scales, so noticeable in *L. cornutus*, fades by insensible degrees into the ordinary *Hybopsis* type.

Under *Luxilus* the following subgeneric sections are probably conveniently recognizable:

a. Luxilus: type *cornutus*.
b. Alburnops: type *blennius*.
c. Hybopsis: type *gracilis*.
d. Hudsonius: type *hudsonius*.

*** XVI. Genus, SHINER, Luxilus, Luxile.** (p. 47.)

Hypsilepis Baird, 1854.
Hybopsis Ag., 1854.
Alburnops and *Hudsonius* Grd., 1856.
Luxilus Jordan, 1876.

1st subgenus, CHROSOMUS. (p. 47.)

39th species, Red-Belly Shiner, LUXILUS ERYTHROGASTER, Luxile erythrogastre. (p. 47.)

***40th species, Gold-Head Shiner, LUXILUS CHRYSOCEPHALUS, Luxile chrysocephale.** (p. 48.)

† LUXILUS CORNUTUS (Mitch.) Jor.

Cyprinus cornutus Mitchill.
Hypsilepis cornutus (Mitch.) Storer and authors.
Plargyrus typicus, cornutus, frontalis, etc., Girard.

Description fair, excepting that the pectorals scarcely reach the ventrals, and older specimens are less elongated. The *cornutus* is very abundant throughout the Ohio Valley, where it is everywhere known as the *Shiner*, a name rarely applied to any other fish. Rafinesque's description is very correct as regards its average appearance in the West when not tuberculate or flushed with red. His account has, however, been carelessly referred to *Cyprinus chrysoleucus* of Mitchill, solely on account of the similarity of the names, although Rafinesque correctly indicates the chief points of difference. As *chrysocephalus* is evidently intended as the type of *Luxilus*, the latter is synonymous with *Hypsilepis*, and we have no alternative but to restore the older name in place of the latter and more scientific appellation.

‡41st species, Kentuckian Shiner, LUXILUS KENTUCKIENSIS, Luxile du Kentucky. (p. 48.)

? ? LUXILUS CORNUTUS (Mit.) Jor.

Not *Luxilus kentuckiensis* Kirtland.

This species is not yet satisfactorily identified. It is certainly not

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* Diameter one-fifth of total length, *silvery* with golden shades on the sides, *head gilt, back and nape dark olivaceous; lateral line curved downwards*, pectoral fins reaching the abdominal. *Dorsal and anal fins with nine rays.*

Vulgar names, Gold Chub, *Shiner*, Goldhead, &c. Length 6 inches. It is found in Kentucky, Ohio, Cumberland, Green River, &c. *Iris golden. Fins fulvous*, the pectoral golden, large, with 14 rays; tail with 24. *It resembles the common Shiner or Butterfish* of Pennsylvania, *Cyprinus chrysoleucos* Mitchill, but that fish is a *Rutilus*, having nine abdominal rays; its body is besides shorter *and the anal fin is falcated with* 15 *rays.*

(Additional evidence of the correctness of this identification is found in a MSS. paper on the Fishes of Pennsylvania, by Rafinesque, now in the possession of Professor Baird. In this paper the species in question is described under the name of *Luxilus cornutus* (Mit.) Raf.

† Diameter one-seventh of total length, silvery, back olivaceous, lateral line curved downwards, *dorsal* and *caudal fins red*, the pectoral yellow, not reaching the abdomen. *Dorsal* 8 *and anal* 7 *rays.*

Vulgar names: Indian Chub, Red-tail, Shiner, &c. Length about 4 inches. It is reckoned an excellent bait for anglers, because it will swim a long while with the hook in its body. Eyes small, iris brown with a gold ring. Yellowish-brown above the head. Abdominal and anal fins white. Pectoral and abdominal fins oboval, with 12 rays. Tail with 24 rays.

the Silver-Fin, *Luxilus kentuckiensis* Kirtland, as has been shown by Professor Cope.

*** 42d species, Yellow Shiner, LUXILUS INTERRUPTUS, Luxile jaunatre.** (p. 49.)

Not identified.

The description contains little that is suggestive, and it might apply to almost any of the small silvery species.

XVII. Genus, CHUBBY, SEMOTILUS, Semotile. (p. 49.)

=*Semotilus* Raf.

43d species, Bigback Chubby, SEMOTILUS DORSALIS, Semotile dorsal (p. 49.)

SEMOTILUS CORPORALIS (Mitchill) Putnam.

44th species, Bighead Chubby, SEMOTILUS CEPHALUS, Semotile cephale. (p. 49.)

SEMOTILUS CORPORALIS (Mitchill) Putnam.

†45th species, Warty Chubby, SEMOTILUS DIPLEMIUS, Semotile verruqueux. (p. 50.)

LYTHRURUS DIPLÆMIUS (Raf.) Jor.

Not *Leuciscus diplæmius* Kirtland (=? *Lux. cornutus* var.).
Hypsilepis diplæmia Cope.

This can hardly be the *Lythrurus diplæmius*, as that species has a long anal fin, and the male fish has, instead of "some black warts on the head", the whole upper surface of the head and neck studded with minute whitish tubercles. Moreover, the dorsal spot is not "round", and there is no caudal spot. Still, as I can at present suggest no better identification, I allow that made by Professor Cope to stand.

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* Diameter one-sixth of total length; yellowish-olivaceous above, silvery beneath, rufous brown above the head, a rufous line from the dorsal to the tail, two straight and separated half lateral lines, the anterior one above the posterior; pectoral fins reaching the abdominal. Dorsal with 10 and anal with 9 rays.

A small species, only 3 inches long, called Yellow Chub or Shiner. Seen in the Ohio. Sides opaque, with violet shades. Iris silvery, mouth large, lips very apparent. Fins yellowish, pectorals with 16 rays, caudals with 24.

† Diameter one-sixth of total length; olivaceous brown with gold shades above, silvery beneath; lateral line double, the anterior and lower curved upwards at the base, reaching to the abdominal fins, the posterior and upper straight from the pectoral fins to the tail; fins red, a spot at the base of the dorsal and caudal, and many dots over them. Dorsals with nine rays; the anal with eight.

Length from 3 to 4 inches, often called Minny or Red-Fin. Observed in the Kentucky River near Estill. The male fish has a larger mouth than the female and some black warts on the head. Fulvous brown on the head. Iris large, golden and white. Some black dots on the dorsal and caudal fins; the caudal spot is on tail and the dorsal at the anterior base; they are small and round. The pectoral fins do not reach the abdominal fins; they have 18 rays; the tail has 24.

*** XVIII. Genus, FALLFISH, Rutilus, Rutile.** (p. 50)

= LEUCISCUS Klein.

†46th species, Silverside Fallfish, RUTILUS PLARGYRUS, Rutile plargyre. (p. 50.)

LUXILUS CORNUTUS (probably).

Rafinesque's account applies about equally well to *Luxilus cornutus* and *Cyprinella analostana* Grd. I prefer to follow Dr. Kirtland and writers generally in identifying it with the preceding species. The name *Plargyrus* is not available for any of our genera of *Cyprinidæ*. As *Cyprinus rutilus* L. is stated to be the type of *Rutilus* Raf., it is the type of that genus, and the provisional name *Plargyrus* is unnecessary.

‡47th species, Baiting Fallfish, RUTILUS COMPRESSUS, Rutile appat. (p. 51.)

Not yet satisfactorily identified. It is probably not *Leuciscus compressus* of Kirtland. It may have been based in part on *Nototropis rubrifrons* (Cope.)

§48th species, Round-Nose Fallfish, RUTILUS AMBLOPS, Rutile amblopse (p. 51.)

NOCOMIS AMBLOPS (Raf.) Cope & Jordan.

Ceratichthys hyalinus Jordan, Man. Vert. (not of Cope).

Description rather indefinite. As Girard has identified it with a species of *Ceratichthys*, I refer it to a member of that genus common at the

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* Difference from *Minnilus*: Vent posterior, nearer to the tail. Abdominal fins with nine rays. Mouth large and with lips. Scales large.

I call this genus *Rutilus*, in the supposition that the *Cyprinus rutilus* may be the type of it; if it should be otherwise, it may be called *Plargyrus*.

† Diameter one-fifth of total length; silvery, back with the dorsal, pectoral, and caudal fins olivaceous; lateral line curved downwards; snout truncate; mouth almost vertical. Dorsal and anal fins with 9 rays.

Length from 4 to 6 inches; vulgar names:—Silverside, Shiner, White Chub, &c. Common in the streams of Kentucky. Mouth large, upper jaw almost vertical, yet longer than the lower. Iris white. Pectoral fins with 14 rays, reaching almost the abdominals, which are oboval and white. Tail forked as usual with 24 rays. Scales large.

‡ Diameter one-seventh of total length; silvery, back fulvous, sides compressed, lateral line straight, raised upwards at the base, *snout rounded, mouth hardly diagonal*, nearly horizontal. Dorsal and anal fins with 9 rays.

A small fish from 2 to 4 inches long, called Fall-fish, Bait-fish, Minny, &c. It is found in the Alleghany Mountains, in the waters of the Monongahela, Kenhawy, and even in the Potomac. The name of Fall-fish arises from its being often found near falls and ripples. Body more compressed than in the other species; as much so as in the genus *Minnilus*. Scales large; lips a little fleshy; iris silvery-gilt; fins transparent; the pectoral with 14 rays, and not reaching the abdominal; tail with 32 rays.

§ Diameter one-sixth of total length; silvery, head fulvous above, snout round;

Falls of the Ohio, which, if distinct from *C. hyalinus* Cope, as Professor Cope thinks, seems not to have received any other name.

49th species, Black-tail Fallfish, RUTILUS MELANURUS, Rutile melanure. (p. 51.)

MYXOSTOMA DUQUESNII (Le S.) Jor. (young).

Description incorrect and insufficient. The "15 dorsal rays" indicates a Sucker, and the coloration is that of a young "Red-Horse".

***50th species, Anomal Fallfish, RUTILUS ANOMALUS, Rutile anomal.** (p. 52.)

? CAMPOSTOMA ANOMALUM (Raf.) Ag.

This description is perhaps intended for *Campostoma*, but it is very imperfect, if not erroneous.

†51st species, Red Minny, RUTILUS ? RUBER, Rutile rouge. (p. 52.)

LYTHRURUS species.

Probably the male fish of one of the species of *Lythrurus* is intended rather than a *Chrosomus*, as supposed by Professor Agassiz. *Lythrurus ardens* is abundant in the upper waters of the Cumberland. Few fishes in our waters are of so "fine a purple red".

XIX. Genus, FAT-HEAD, PIMEPHALES, Pimephale. (p. 52.)

52d species, Blackheaded Fat-head, PIMEPHALES PROMELAS, Pimephale tete-noire. (p. 53.)

PIMEPHALES PROMELAS Raf.

Description fair. This species is very abundant in small streams about the Falls of the Ohio.

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sides with an opaque band, lateral line straight; pectoral fins with 12 rays, and reaching the abdominal fins. Dorsal and anal fins with 10 rays.

Length 1 or 2 inches. Vulgar name: White Chub, or Fall-fish. It is found at the falls of the Ohio. Back slightly fulvescent, *snout large and rounded*, mouth hardly diagonal, *eyes large, iris silvery, and scales large*. Tail with 30 rays.

* Diameter one-fifth of total length, fulvous above, sides dusky, white beneath, snout rounded, a vertical brown line behind the gills; lateral line straight, raised upwards at the base; pectoral fins yellow, oboval, short, with 15 rays; tail unequally bilobed, the upper lobe larger. Dorsal and anal fins red; dorsal 8 and anal 7 rays.

An anomalous fish, differing from all those of the Cyprinian tribe in the Ohio, by its unequal bilobed tail, which is brownish, and has 22 rays. Mouth diagonal. Eyes small; iris olivaceous gilt. Nape of the neck red, scales rather small. Length 3 inches. Found in Licking River, &c. Vulgar names: Chub, Redfish, Fallfish, &c.

† Entirely red; tail forked.

I add here a fine small fish, which I have never seen as yet, but it is said to live in the small streams which fall into the Elkhorn and Kentucky. It is a slender fish, only 2 inches long, compressed, and of a fine purple red. It may belong to this genus, or to any other of this tribe. It is commonly called Red-minny.

XX. Genus, SUCKER, CATOSTOMUS, Catostome. (p. 53.)

*** 1st subgenus, MOXOSTOMA.** (p. 54.)

Myxostoma Jor.

(Not *Moxostoma* of Agassiz and authors = *Erimyzon m.*)

† 53d species, Ohio Carp-Sucker, CATOSTOMUS ANISURUS, Catostome anisure. (p. 54.)

MYXOSTOMA ANISURA (Raf.) Jordan.

(Not *Moxostoma anisurus* Agassiz=*Erimyzon oblongus* (Mit.) Jordan.)

Catostomus anisurus Kirtland.

Ptychostomus collapsus Cope.

This species, described by Rafinesque, and described and figured by Dr. Kirtland, is said to possess a lateral line, and to have red fins. Furthermore, it is known as "Carp", and reaches a length of 1 to 3 feet. It is evidently not a *Moxostoma* as that genus is defined by Agassiz, but a *Ptychostomus*. *Moxostoma* becomes, therefore, a synonym of *Ptychostomus*, and having priority must supersede it. In accordance with the etymology of the word, I have changed the first vowel *o* to *y*.

54th species, Buffalo Carp-Sucker, CATOSTOMUS ANISOPTERUS, Catostome anisopture. (p. 54.)

? *Carpiodes velifer* (Raf.) Ag.

An insufficient description of some *Carpiodes* "from a drawing by Mr. Audubon". Rafinesque remarks: "The *C. tuberculatus* of Le Sueur belongs also to this subgenus, having 8 abdominal rays, but its tail is regularly bifid".

2d subgenus, ICTIOBUS. (p. 55.)

= *Ichthyobus* Agassiz.

"The *C. gibbosus* and *C. communis* of Le Sueur appear to be intermedi-

* Body oblong, compressed; head compressed, eight abdominal rays, dorsal fin commonly longitudinal; tail commonly unequally forked.

† Diameter one-fifth of the length; *silvery, slightly fulvescent above, fins red*, the dorsal olivaceous, falcated *with* 17 *rays*, nearer to the head and reaching the vent; *lateral line curved upwards and flexuose at the base;* snout gibbose; tail forked, upper part longer. Anal fin falcate with 8 rays.

A *large* species common all over the Ohio and the large streams, as far as Pittsburgh. Permanent and sometimes taken in winter. It is called Carp everywhere. Length from *one to three feet*. It is taken with the hook, seine and dart. Its flesh is pretty good, but soft. The male fish has a *red tail;* while it is olivaceous in the female. *Snout divided from the head by a transverse hollow which makes it gibbose.* Eyes black, iris silvery and golden above. Sides often with copper shades. Scales large with concentric stria. Pectoral fins large, oval acute, with 15 rays, and reaching the abdominal fins. Caudal with 24 rays.

ate between this subgenus and the foregoing, having 9 abdominal rays, but an unequally bilobed tail."—(Raf.)

55th species, Brown Buffalo-Fish, CATOSTOMUS BUBALUS, Catostome bubale. (p. 55.)

ICHTHYOBUS BUBALUS (Raf.) Ag.

Description passable.

*** 56th species, Black Buffalo-Fish, CATOSTOMUS NIGER, Catostome noir.** (p. 56.)

? BUBALICHTHYS NIGER (Raf.) Ag.

Description insufficient.

3d subgenus, CARPIODES. (p. 56.)

Carpiodes Agassiz and authors.

"The *C. cyprinus* and *C. setosus* of Le Sueur belong to this subgenus."—(Raf.)

† 57th species, Olive Carp-Sucker, CATOSTOMUS CARPIO, Catostome carpe. (p. 56.)

CARPIODES CARPIO Raf.

Carpiodes nummifer Cope.

This description apparently refers to the species lately called *C. nummifer* by Professor Cope. I therefore adopt Rafinesque's specific name.

58th species, Sailing-Sucker, CATOSTOMUS VELIFER, Catostome volant. (p. 56.)

CARPIODES VELIFER (Raf.) Ag.

A fair description.

‡ 59th species, Mud-Sucker, CATOSTOMUS XANTHOPUS, Catostome xanthope. (p. 57.)

HYPENTELIUM NIGRICANS (Le S.) Jor.

It is possible that this description was intended for the *Cat. nigricans* Le S., but the latter is certainly not a "mud-fish", as Professor Agassiz

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* Entirely black, lateral line straight.

I have not seen this fish. Mr. Audubon describes it as a peculiar species, found in the Mississippi and the lower part of the Ohio, being entirely similar to the common Buffalo-fish, but larger, weighing sometimes upwards of 50 pounds, and living in separate shoals.

† Diameter one-fourth of the length; olivaceous above, pale beneath, chin white, abdomen bluish; lateral line straight, dorsal fin somewhat falcated with 36 rays, and trapezoidal with 10 rays; head sloping, snout rounded.

Seen at the falls of the Ohio; commonly called Carp. Length from one to two feet. Eyes very small and black; fins olivaceous brown, the pectorals olivaceous, trapezoidal, short, and with 16 rays. Tail with 24. Dorsal fin beginning before the abdominal and reaching the end of the anal fin. Not so good to eat as the Buffalo-fish.

‡ Diameter one-fourth of the length; lateral line straight; silvery, back olivaceous.

seemed to suppose. Of all the Suckers, it is the most readily affected by impure water, and it is usually to be found only in clear, running streams.

***4th subgenus TERETULUS.** (p. 57.)

Of the species assigned to this subgenus, three belong apparently to *Myxostoma*, three to *Catostomus* proper, two to *Hypentelium*, five to *Erimyzon*, one is a *Cyprinoid*, and the last a myth.

As the name *Teretulus* has been restricted to the genus typified by *Catostomus aureolus* Le S., it is best to consider it as a synonym of *Myxostoma*.

† 60th species, Black-face Sucker, CATOSTOMUS MELANOPS, Catostome melanopse. (p. 57.)

ERIMYZON SUCETTA (Lac.) Jor.

? *Cyprinus sucetta* Lac.
Catostomus melanops Kirtland.
Ptychostomus melanops Agassiz and authors.
Erimyzon melanops (Raf.) Jordan.

Description poor but unmistakable. This fish has the air-bladder in two parts, and the lateral line is obsolete, as stated by Kirtland. It is

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head brown above, snout gibbose rounded; dorsal fin hardly falcate with 14 rays, anal anceolate with 8 rays; lower fins yellowish.

Found below the falls. Length from 6 to 10 inches. It lives in muddy banks and conceals itself in the mud. Flesh very soft. Head large, flattened above, mouth large, eyes large. Iris silvery. Lateral line hardly raised at the base. Dorsal fin above the abdominal, fins olivaceous as well as the tail, which has 20 rays. Pectorals with 18 rays. Scales large.

* Body elongate cylindrical or somewhat quadrangular, 9 abdominal rays, dorsal fins commonly small, tail equally forked.

An extensive subgenus, to which belong all the following species of Le Sueur: *C. aureolus*, *C. macrolepidotus*, *C. longirostrum*, *C. nigricans*, *C. vittatus*, *C. maculosus*, *C. sucetta*, besides the *C. teres* and *C. oblongus* of Mitchill.

† Diameter one-seventh of the length; head squared, blackish above, snout convex obtuse; *back olivaceous, sides whitish with scattered black dots*, a black spot on the gill cover, and a large one between the dorsal and caudal fins; lateral line straight, dorsal fin with 14 rays, anal with 9 rays.

A singular species seen at the falls. It is rare, and called *Spotted Sucker* or *Black Sucker*. Length from 4 to 6 inches; body cylindrical, flattened beneath as far as the vent. Head flat above, blackish there and in the fore part. Mouth almost terminal with thick whitish lips, the lower one shorter and thicker, a few small black spots on the sides of the head, and a large one on the preopercule. Gill cover silvery. Eyes black, iris brown with a gold ring. Back of a rufescent color with gold shades. A very large black patch above the anal fin before the tail. *Sides pale with small unequal black dots*, belly whitish. *Fins coppery*, the pectoral elliptical elongated with 18 rays, the anal elongated reaching the tail, the dorsal broad and opposed to the abdominal. Tail with 20 rays. *Scales rather large* nervose radiated.

therefore an *Erimyzon* and not a "*Ptychostomus*". Both *E. oblongus* and *E. melanops* abound in the lakes as well as in the Ohio. They are much more tenacious of life than the other Suckers. The description of *Cyprinus sucetta* Lacépède (*Catostomus suceti* C. & V.) seems to refer to this species. I therefore have adopted the prior name *sucetta* in preference to that of *melanops*.

The "lateral line" alluded to by Rafinesque here, as in numerous other instances, is merely a lateral streak along the rows of scales, either due to longitudinal furrows or else to peculiarities of coloration.

*** 61st species, Black-back Sucker, CATOSTOMUS MELANOTUS, Catostome melanote.** (p. 58.)

? CAMPOSTOMA ANOMALUM (Raf.) Ag.

The "nine dorsal rays" indicates a *Cyprinoid*, and the only species found at the Falls of the Ohio which at all answers this description is the *Nocomis biguttatus* and *Campostoma anomalum*. It is best to identify it with the latter, and thus to avoid a change of names.

† 62d species, Rough-head Sucker, CATOSTOMUS FASCIOLARIS, Catostome fascie. (p. 58.)

ERIMYZON OBLONGUS (Mitch.) Jor.

Moxostoma oblongum (Mitch.) Ag.

Description indifferent, "from a drawing by Mr. Audubon". The tuberculated snout indicates a spring male of *oblongus*, rather than [illegible] Professor Agassiz refers Rafinesque's description

***63d species, Red-tail Sucker, CATOSTOMUS ERYTHRURUS, Catostome rougequeue.** (p. 59.)

MYXOSTOMA DUQUESNII (Le S.) Jor.

? *Catostomus duquesnei* Le Sueur.

Ptychostomus erythrurus (Raf.) Cope.

Ptychostomus duquesnei (Le S.) Ag.

Description not very good. The common "Red-Horse" of the Ohio is certainly Le Sueur's *duquesnei*. Professor Cope recognizes Rafinesque's species as distinct, but I have not yet been able to separate it.

†64th species, Kentucky Sucker, CATOSTOMUS FLEXUOSUS, Catostome flexueux. (p. 59.)

CATOSTOMUS TERES (Mitch.) Le S.

Description fair. Professor Agassiz is certainly wrong in referring this species to the *Cat. nigricans* of Le Sueur. The description accords better with *Cat. teres*, and the statements with regard to the habits and common name point very strongly to this species, which is still known everywhere in Kentucky as the "Sucker".

‡65th species, Big-mouth Sucker, CATOSTOMUS ? MEGASTOMUS Catostome megastome. (p. 59.)

A myth.

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* Diameter one-fifth of the length: rufous brown above, white beneath: tail olivaceous: head convex, snout rounded: lateral line straight: dorsal fin trapezoidal, reddish with 12 rays: anal fin elongated, yellow, anal falcated, with 7 rays.

A fine species, not uncommon in the Ohio, Kentucky, Cumberland, Tennessee, &c. Vulgar names: Red-horse, Red-tail, Horse-fish, Horse-Suckers, &c. Length about one foot. Scales very large. Mouth beneath. Iris whitish, eyes black. Pectoral fins yellow, elliptical, reaching the abdominals, and with 16 rays. Tail large with 20 rays. Its flesh is dry and not very good to eat.

† Diameter one-fifth of the length; silvery, back brownish, scales rather rough, opercule flexuose; head squared, snout gibbose truncate; lips very thick, the inferior bilobed; lateral line flexuose; tail brown; dorsal fin blackish with 12 rays, anal fin whitish with 7 rays and reaching the tail.

The most common species, in Kentucky, in all the streams and ponds, called merely Sucker. Very good to eat. It conceals itself in the mud in winter. It bites at the hook, living on minnies and little lobsters. Body thick cylindrical. From 10 to 12 inches long. Head large, a deep depression between the snout and the head, mouth large with fleshy lips. Eyes large, black, iris yellow. Opercule hard bony. Lower fins whitish, pectorals elongated elliptical with 20 rays. Tail 20 rays. Dorsal trapezoidal, sloping behind. This fish is the most useful to keep in ponds.

‡ Diameter one-fifth of the length; blackish above, yellowish beneath, very broad; a spine at the base of the pectoral fins; lateral line straight.

A very doubtful species seen by Mr. Audubon. It comes sometimes in shoals in March, and soon disappears. Only taken with the seine, not biting at the hook; vulgar name, Brown Sucker. The mouth is very remarkable, being broader than the head, somewhat projecting on the sides; length one foot. The head resembles that of a Cat-fish, but has no barbs. Is it a peculiar genus owing to the mouth and pectoral spine? It might be called *Eurystomus*. The yellow color covers the forehead and reaches to the anal fin. Dorsal opposed to the abdominal and trapezoidal, pectorals elliptical, yellow.

***5th subgenus, DECACTYLUS.** (p. 60.)

66th species, Pittsburgh Sucker, CATOSTOMUS DUQUESNI, Catostome duquesne. (p. 60.)

MYXOSTOMA DUQUESNII (Le S.) Jor.

67th species, Long Sucker, CATOSTOMUS ELONGATUS, Catostome alonge. (p. 60.)

CYCLEPTUS ELONGATUS (Le S.) Ag.

XXI. Genus, SUCKREL, CYCLEPTUS, Cyclepte. (p. 61.)

68th species, Black Suckrel, CYCLEPTUS NIGRESCENS, Cyclepte noiratre. (p. 61.)

CYCLEPTUS ELONGATUS (Le S.) Ag.

A very poor description, "on the authority of Mr. Bollman, of Pittsburgh".

†XXII. Genus, CATFISH, PIMELODUS, Pimelode. (p. 61.)

Subgenus, ICTALURUS. (p. 61.)

1st section, ELLIOPS. (p. 62.)

Tail forked. Eyes elliptical. Abdominal fins with less than nine rays.

69th species, Spotted Catfish, PIMELODUS MACULATUS, Pimelode tachete. (p. 62.)

ICHTHÆLURUS PUNCTATUS (Raf.) Jor.

Silurus punctatus Raf., 1818.

70th species, Blue Catfish, PIMELODUS CERULESCENS, Pimelode bleuatre. (p. 63.)

ICHTHÆLURUS PUNCTATUS (Raf.) Jor.

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* Body nearly cylindrical, abdominal fins with 10 rays; tail equally forked.

Besides the two following species, the *C. bostoniensis* and *C. hudsonius* must be enumerated here.

† Body scaleless, elongated. Head large, with barbs. Two dorsal fins, the second adipose and separated from the tail, the first short and commonly armed. Pectoral fins commonly armed. Teeth like a file. Vent commonly posterior.

The extensive genus *Silurus* of Linnæus, which is scattered throughout the rivers of both continents, has not yet been completely illustrated, notwithstanding the labors of the modern ichthyologists. I have found in the Ohio about twelve species belonging to it, most of which offer consimilar character, and appear to belong to the genus *Pimelodus* of Lacépède and Cuvier, which have left the name of *Silurus* to the species having one dorsal fin. I have already published a monography of them in the Journal of the Royal Institution of London, under the generic name of Silurus. I now propose to form with them a peculiar *subgenus*, divided in many sections, and different from the subgenera *Bagrus*, *Synodontus*, *Silusox*, &c.

71st species, White Catfish, PIMELODUS PALLIDUS, Pimelode pale. (p. 63.)

ICHTHÆLURUS PUNCTATUS (Raf.) Jor.

72d species, Silvery Catfish, PIMELODUS ARGYRUS, Pimelode argyre. (p. 64.)

ICHTHÆLURUS PUNCTATUS (Raf.) Jor.

2d section, LEPTOPS. (p. 64.)

Tail bilobed. Eyes round and small. Nine abdominal rays. Vent posterior. Adipose fin large.

73d species, Clammy Catfish, PIMELODUS VISCOSUS, Pimelode visqueux. (p. 64.)

PELODICHTHYS OLIVARIS (Raf.) Gill & Jor.

Jaws nearly equal, barbs very short, eyes round, over the head. Body entirely brown, lateral line raised upwards before. Pectoral fins with 1 and 7 rays, anal fin rounded with 15 rays. Tail unequally bilobed and black, upper lobe smaller and white.

75th species, Clouded Catfish, PIMELODUS NEBULOSUS, Pimelode nebuleux. (p. 64.)

PELODICHTHYS OLIVARIS (Raf.) Gill & Jor.

This species is made to form a "peculiar section or even subgenus", termed *Opladelus*.

2d section, AMEIURUS. (p. 65.)

Tail entire. Eyes round. Eight abdominal rays. Vent posterior. Dorsal fin anterior with a spine. Lower jaw not longer. Pectoral fins with one simple spine and seven rays.

75th species, Yellow Catfish, PIMELODUS CUPREUS, Pimelode cuivre. (p. 65.)

AMIURUS LIVIDUS CUPREUS (Raf.) Jor.

***76th species, Brown Catfish, PIMELODUS LIVIDUS, Pimelode livide.** (p. 65.)

AMIURUS LIVIDUS (Raf.) Jor.

Amiurus catus (Grd.) Gill. (Not *Silurus catus* L.)

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* Jaws equal, barbs nearly equal together and as long as the head. Eyes round. Body entirely of a livid-brown color. Tail rounded entire. Lateral line raised upwards at the base. Anal fin elongate with 25 rays.

Silurus lividus, Monogr. sp. 7.

A small species, entirely of a leaden brown. Head short, slightly olivaceous; throat pale. Barbs equal, the upper ones livid, the lower ones rufous. A furrow on the head which is convex above. Operculum flexuose. Tail with 24 rays. Dorsal with 1 and 7. Spines short.

*** 77th species, Black Catfish, PIMELODUS MELAS, Pimelode noir.** (p. 66.)

AMIURUS MELAS (Raf.) Jordan.

Amiurus obesus Gill.

† 78th species, Yellow-Head Catfish, PIMELODUS XANTHOCEPHALUS, Pimelode xanthocephale. (p. 66.)

AMIURUS XANTHOCEPHALUS (Raf.) Gill.

4th section, ILICTIS. (p. 66.)

Tail entire, eyes elliptical. Nine abdominal rays. Dorsal fins submedial. Pectoral fins with one flat spine serrated outwards and nine rays. Lower jaw longer.

79th species, Mud-Catfish, PIMELODUS LIMOSUS, Pimelode bourbeux. (p. 66.)

PELODICHTHYS OLIVARIS (Raf.) Gill & Jor.

‡ XXIII. Genus, MUDCAT, PILODICTIS, Pylodicte. (p. 67.)

PYLODICTIS Raf., 1819.
OPLADELUS Raf., 1820.
HOPLADELUS Gill, 1861.

[redacted]

*80th species, Toad Mudcat, **PYLODICTIS LIMOSUS**, Pylodicte bourbeux. (p. 67.)

PELODICHTHYS OLIVARIS (Raf.) G. & J.

†**XXIV. Genus, BACKTAIL, NOTURUS**, Noture. (p. 67.)

‡**81st species, Yellow Backtail, NOTURUS FLAVUS**, Noture jaune. (p. 68.

NOTURUS FLAVUS Raf.

XXV. Genus, TOTER, HYPENTELIUM, Hypentele. (p. 68.)

82d species, Ohio Toter, HYPENTELIUM MACROPTERUM, Hypentele macroptere. (p. 68.)

HYPENTELIUM NIGRICANS (Le Sueur.) Jor.

Catostomus nigricans Le Sueur (young).
Hylomyzon nigricans (Le S.) Ag.
Hypentelium nigricans (Le S.) Jordan.

Description very good. If *Catostomus nigricans* be considered generically distinct from *C. hudsonius*, we have no alternative but to substitute *Hypentelium* for *Hylomyzon* of later date.

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* Lower jaw longer, eyes round, eight barbs, four above and four below. Head verrucose above. Body brown, clouded, and dotted with yellowish, reddish, and bluish; one row of transversal black lines on each side of the back. No lateral line. Tail entire and truncate.

I have not seen this fish, but describe it from a drawing of Mr. Audubon. It is found in the lower part of the Ohio and in the Mississippi, where it lives on muddy bottoms, and buries itself in the mud in the winter. It reaches sometimes the weight of 20 pounds. It bears the name of Mudcat, Mudfish, Mud-Sucker, and Toadfish. It is good to eat, and bites at the hook. The head is broader than the body, and with a very large mouth; the barbs appear to lie in four pairs, two above, longer and near the nostrils, and two smaller under the lower jaw. The first dorsal fins triangular and above the abdominals, which are nearer the pectorals than to the anal. Second elongate with many rays. Number of rays unnoticed.

† Difference from *G. Pimelodus*, *S. G. Ictalurus*, and sect. *Ameiurus*: Adipose dorsal fin very long, decurrent, and united with the tail, which is decurrent on each side, but unconnected with the anal fin.

Genus 18th of the Prodr. N. G. It differs from the genus *Plotosus* of Lacépède by having the anal fin free, and from *Pimelodus* by the connection of the tail with the second dorsal fin. The name means "tail over the back". The *Silurus gyrinus* of Mitchill must belong to this genus.

‡ Entirely yellowish. Upper jaw longer, barbs half the length of the head. Eyes round. Lateral line nearly straight. Anal fin with 14 rays. Tail entirely truncate.

A small species, very common near the falls. Length 4 to 12 inches. It agrees in almost everything with the section *Ameiurus* among the Catfishes. Vulgar name Yellow Catfish, like the *Pimelodus cupreus*. Dorsal fin with 1 and 7 rays, rounded spine very short and obtuse. Second dorsal beginning before the anal and extending to the tail in a curve. All the lower fins rounded. Pectorals with 1 and 7 rays, spine equal and acute. Abdominal fins with 8 rays. All the fins fleshy and fat. Head flat above. Barbs unequal. Belly convex. Hind part of the body compressed.

XXVI. Genus, RIBBON-FISH, SARCHIRUS, Sarchire. (p. 69.)

83d species, Ohio Ribbon-Fish, SARCHIRUS VITTATUS, Sarchire rubanne. (p. 69.)

Lepidosteus sp. (young).

Description inaccurate.

*** XXVII. Genus, PIKE, ESOX, Brochet.** (p. 70.)

† 84th species, Streaked Pike, ESOX VITTATUS, Brochet raye. (p. 70.)

Thus far unrecognized.

‡ 85th species, Salmon-Pike, ESOX SALMONEUS, Brochet saumonne. (p. 71.)

ESOX SALMONEUS Raf.

? *Esox umbrosus* Kirtland.

Description probably second hand and not very good. It is probably *Esox umbrosus*, which species abounds in the bayous of the Ohio, but

* Body cylindrical or very long, covered with small scales, vent posterior. One dorsal fin behind the abdominal fins. Mouth large, jaws long and flattened, with very strong teeth; opening of the gills very large. Head bony, scaleless. Tail not obliqual. All the fins with rays.

There are several species of Pikes in the Ohio, Mississippi, Wabash, Kentucky, &c. I have not yet been able to observe them thoroughly. I have, however, procured correct accounts and figures of two species; but there are more. They appear to belong to a peculiar subgenus distinguished by a long dorsal fin, a forked tail, and the abdominal fins anterior, being removed from the vent. It may be called *Picorellus*. The French settlers of the Wabash and Missouri call them *Piconeau*, and the American settlers Pikes or Pickerels. They are permanent but rare fishes, retiring, however, in deep waters in winter. They prefer the large streams, are very voracious, and grow to a large size. They prey on all the other fishes except the Gar-fishes, &c. They are easily taken with the hook, and afford a very good food, having a delicate flesh.

† White, with two blackish longitudinal streaks on each side, back brownish; jaws nearly equal, very obtuse, eyes large and behind the mouth; dorsal fins longitudinal between the abdominal and anal fins; tail forked.

E. vittatus. Raf. in American Monthly Magazine 1818, volume 3, page 447.

This fish is rare in the Ohio (although it has been seen at Pittsburgh), but more common in the Wabash and Upper Mississippi. It is called *Piconeau* or *Picaneau* by the Canadians and Missourians. It reaches the length of from three to five feet. The pectoral and abdominal fins are trapezoidal, the anal and dorsal longitudinal with many rays and nearly equal. It is sometimes called Jack or Jackfish. Lateral line straight.

‡ *White, with many narrow transversal brown bands, somewhat curved;* jaws nearly equal, *very obtuse;* dorsal fins brown, longitudinal and extending over the anal fins; tail forked and brown.

It is one of the best fishes in the Ohio; its flesh is very delicate, and divides easily, as in Salmon, into large plates as white as snow. It is called Salmon Pike, White Pike, White Jack or White Pickerel, and *Picaneau blanc* by the Missourians. *It has a short and thick head*, eyes not very large, and situated upwards. Pectoral and abdominal fins trapezoidal. Dorsal fin beginning behind these last and extending over the anal. The number of transversal bands is twelve or more, rather distant, and with the concavity towards the head. It reaches the length of 5 feet. Lateral line nearly straight.

the statement that it "reaches the length of 5 feet" renders the identification doubtful. I have never seen it more than a foot long. The name *Picorellus* may be retained for the section of *Esox*, which has the cheeks and opercles entirely scaly, if a subgeneric name for that group is considered desirable.

XXVIII. Genus, GARFISH, LEPISOSTEUS, Lepisoste. (p. 71.)

1st subgenus, CYLINDROSTEUS. (p. 72.)

86th species, Duck-Bill Garfish, LEPISOSTEUS PLATOSTOMUS, Lepisoste platostome. (p. 72.)

LEPIDOSTEUS PLATYSTOMUS Raf.

Description fair.

87th species, White Garfish, LEPISOSTEUS ALBUS, Lepisoste blanc. (p. 73.)

Probably same as preceding.

88th species, Ohio Garfish, LEPISOSTE OXYURUS, Lepisoste oxyure. (p. 73.)

LEPIDOSTEUS OSSEUS (L.) Ag. (probably).

89th species, Long-Bill Garfish, LEPISOSTEUS LONGIROSTRIS, Lepisoste longirostre. (p. 74.)

LEPIDOSTEUS OSSEUS (L.) Ag.

2d subgenus, ATRACTOSTEUS. (p. 75.)

Atractosteus Grd. and authors.

Litholepis Raf. Am. Monthl. Mag. 1818, III, 447.

90th species, Alligator-Garfish, LEPISOSTEUS FEROX, Lepisoste feroce. (p. 75.)

LITHOLEPIS SPATULA (Lacép.) Jor.

Atractosteus ferox (Raf.) Grd.

Litholepis adamantinus Raf.

Description pretty good. The generic name *Litholepis*, having two years' priority, must supersede *Atractosteus*. The specific name *spatula* (Lacépède) antedates both *adamantinus* and *ferox*.

* **XXIX. Genus, DIAMOND-FISH, LITHOLEPIS, Litholepe.** (p. 76.)

* Body fusiform, covered with *hard, stony* pentaedral *scales*, vent nearly medial. Abdominal fin near the vent. *One dorsal fin opposite the anal.* Head *bony, scaleless, protruded* anteriorly in a long snout; mouth beneath the head; *jaws not elongated, with strong unequal teeth.* Opening of the gills very large. Tail not obliqual. All the fins with rays.

A very singular genus, which comes very near to the last genus, but differs by the snout, mouth, tail, scales, &c. It must belong, however, to the same family. The name means *Stony Scales.*

*** 91st species, Devil-Jack Diamond-fish, LITHOLEPIS ADAMANTINUS, Litholepe adamantin.** (p. 76.)

LITHOLEPIS SPATULA (Lac.) Jor.

Description at second hand and erroneous in several respects, but unquestionably referring to the Alligator-Gar.

XXX. Genus, EEL, ANGUILLA, Anguille. (p. 77.)

Subgenus CONGER. (p. 77.)

† 92d species, Broad-Tail Eel, ANGUILLA LATICAUDA, Anguille large queue. (p. 77.)

ANGUILLA VULGARIS Fleming.

Anguilla bostoniensis (Le Sueur) Dekay and of authors.
Anguilla rostrata (Le Sueur) Dekay(the earliest American name).

If, as is claimed by Dareste, there is but one species of *Anguilla* in the northern hemisphere, the four species of Rafinesque belong to it. *Muræna rostrata* (Le S.), applied to the eel of the inland lakes of New York, is the oldest American name.

93d species, Black Eel, ANGUILLA ATERRIMA, Anguilla noire. (p. 78.)

94th species, Yellow-Belly Eel, ANGUILLA XANTHOMELAS, Anguilla xanthomele. (p. 78.)

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* *Snout obtuse, as long as the head;* head one-fourth of total length; body fusiform blackish; dorsal and anal fins equal and with many rays; tail bilobed, lateral line obsolete.

Litholepis adamantinus Raf. in American Monthly Magazine 1818, vol. 3, p. 447, and in *Journal de Physique et Hist. Nat.* 70, *N. G. d'Animaux G.* 20.

This may be reckoned the wonder of the Ohio. It is only found as far up as the falls, and probably lives also in the Mississippi. I have seen it, but only at a distance, and have been shown some of its singular scales. Wonderful stories are related concerning this fish, but I have principally relied upon the description and figure given me by Mr. Audubon. Its length is from 4 to 10 feet. One was caught which weighed 400 pounds. It lies sometimes asleep or motionless on the surface of the water, and may be mistaken for a log or a snag. It is impossible to take it in any other way than with the seine or a very strong hook, the prongs of the gig cannot pierce the scales which are as hard as flint, and even proof against lead balls! Its flesh is not good to eat. It is a voracious fish. Its vulgar names are Diamond Fish (owing to its scales being cut like diamonds), Devil Fish, Jack Fish, Garjack, &c. The snout is large, convex above, very obtuse; the eyes small and black; nostrils small, round before the eyes; mouth beneath the eyes, transversal with large angular teeth. Pectoral and abdominal fins trapezoidal. Dorsal and anal fins equal, longitudinal, with many rays. Tail obtusely and regularly bilobed. The whole body covered with large stone scales, lying in oblique rows; they are conical, pentagonal and pentaedral, with equal sides from half an inch to one inch in diameter, brown at first but becoming of the color of turtle shell when dry. They strike fire with steel! and are ball proof!

† One individual of this species poisoned once slightly a whole family, causing violent colicks, which was ascribed to its having been taken in the vitriolic slate rocks of Silver Creek, near the falls.—(*Raf.*)

95th species, Yellow Eel, ANGUILLA LUTEA, Anguilla jaune. (p. 78.)

XXXI. Genus, STURGEON, ACCIPENSER, Eturgeon. (p. 76.)

1st subgenus, STURIO (5 rows of plates). (p. 79.)

96th species, Spotted Sturgeon, ACCIPENSER MACULOSUS, Eturgeon tachete. (p. 79.)

ACIPENSER MACULOSUS Le S. and authors.

97th species, Shovel-Fish Sturgeon, ACCIPENSER PLATORHYNCHUS, Eturgeon pelle. (p. 80.)

SCAPHIRHYNCHOPS PLATYRHYNCHUS (Raf.) Gill.

2d subgenus, STERLETUS (3 rows of plates). (p. 80.)

98th species, Fall Sturgeon, ACCIPENSER SEROTINUS, Eturgeon tardif. (p. 80.)

This and the next are probably *Acipenser rubicundus* Le Sueur, but I can throw no new light on this perplexing subject.

99th species, Ohio Sturgeon, ACCIPENSER OHIENSIS, Eturgeon de l'Ohio. (p. 81.)

100th species, Big-Mouth Sturgeon, ACCIPENSER MACROSTOMUS, Eturgeon beant. (p. 81.)

XXXII. Genus, DOUBLE-FIN, DINECTUS, Dinecte. (p. 82.)

A sturgeon with "two dorsal and no abdominal fins".

101st species, Flat-Nose Double-Fin, DINECTUS TRUNCATUS, Dinecte camus. (p. 82.)

Description from a drawing by Mr. Audubon, which represents, as suggested by Rafinesque, "only a sturgeon incorrectly drawn".

XXXIII. Genus, SPADE-FISH, POLYODON, Polyodon. (p. 82.)

102d species, Western Spade-Fish, POLYODON FOLIUM, Polyodon feuille. (p. 82.)

POLYODON FOLIUM Lacépède.

Description mainly correct.

XXXIV. Genus, PADDLE-FISH, PLANIROSTRA, Planirostre.

103d species, Toothless Paddle-Fish, PLANIROSTRA EDENTULA, Planirostre edente. (p. 83.)

POLYODON FOLIUM Lacépède (adult).

XXXV. Genus, LAMPREY, PETROMYZON, Lamproie. (p. 84.)

***104th species, Black Lamprey, PETROMYZON NIGRUM, Lamproie noire.** (p. 84.)

AMMOCŒTES NIGER (Raf.) Jor.

Petromyzon niger Grd.

Description insufficient, but I am unable to find that the common little Black Lamprey of the West has received any other name.

SUPPLEMENT. (p. 85.)

†XXXVI. Genus, SPRING-FISH, PEGEDICTIS, Pegedicte. (p. 85.)

ETHEOSTOMA Raf. Gill & Jordan emend.

CATONOTUS Agassiz.

‡105th species, Cat's-Eye Spring-Fish, PEGEDICTIS ICTALOPS, Pegedicte œuil de chat. (p. 85.)

ETHEOSTOMA FLABELLARIS Raf.

Description indifferent. The characters indicate a species of Darter, and the eight dorsal spines point to the *flabellaris*.

6th genus, ETHEOSTOMA. (p. 85.)

106th species, Springs Hogfish, ETHEOSTOMA FONTINALIS, Etheostome des fontaines. (p. 86.)

ETHEOSTOMA FLABELLARIS Raf.

Description very good.

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* Entirely blackish, tail oval acute, second dorsal over the vent, several rows of teeth.

A very small species, from 4 to 5 inches long; it is found as high as Pittsburgh. Dorsal fins shallow, and distant from each other and the tail. Eyes round and large. Branchial holes small. No lateral line. Mouth oval, teeth white and yellow. It torments sometimes the Buffalo-fish and Sturgeons upon which it fastens itself. It is never found in sufficient quantity to be used as food.

† Body conical, with *small scales*, belly flat, vent medial. Head broad, scaleless, gill covered with a membranaceous appendage and a concealed spine, mouth toothed. Two dorsal fins, the first with simple, soft, semi-spinescent rays. Thoracic fins with five rays.

This new genus belongs to the family *Percidia* and has many affinities with the G. *Holocentrus, Lepomis, Etheostoma, &c.*, but its conical form and many other secondary peculiarities distinguish it completely. The name means Fountain-fish.

‡ Jaws equal, forehead knobby, eyes elliptical. Body *olivaceous with some black transversal unequal brown bands;* a concealed spine on the gill cover; lateral line straight; tail elliptical. The first dorsal fin with 8 *rays, the second with* 12, as well as the anal and pectoral fins.

I have discovered this species in the summer of 1820 near Lexington. It has no vulgar name. Length hardly 2 inches. Head large, brown, convex above, with several small knobs on the forehead, flat beneath. Eyes as in the Catfishes with oblong eyes, iris gilt brown. Spine of the gill cover concealed under the skin. Teeth small and acute. *Pectoral fins large lanceolate.* Belly white and flat. Fins hyalin with some brown spots. Five transversal bands. The specific name means cat's eye.

17th genus, SEMOTILUS. (p. 86.)

***107th species, Silver-Spotted Chubby, SEMOTILUS ? NOTATUS, Semotile tache.** (p. 86.)

ZYGONECTES NOTATUS (Raf.) Jor.

Zygonectes olivaceus (Storer) Agassiz.

This description evidently refers to some Cyprinodont fish. The translucent spot on the head of *Zygonectes* is so characteristic and conspicuous in life that I have no doubt that Rafinesque had that common species in mind.

26th genus, SARCHIRUS. (p. 86.)

†108th species, Silver Ribbon-Fish, SARCHIRUS ? ARGENTEUS, Sarchire argente. (p. 86.)

Unidentifiable.

Description erroneous and insufficient.

31st genus, ACCIPENSER. (p. 86.)

109th species, Gourd-Fish Sturgeon, ACCIPENSER LAGENARIUS Eturgeon gourde. (p. 86.)

? *Polyodon folium.*

Description second hand and erroneous.

XXXVII. Genus, SAWFISH, PRISTIS, Poisson-scie. (p. 86.)

110th species, Mississippi Sawfish, PRISTIS MISSISSIPPIENSIS, Poisson-scie du Mississippi. (p. 86.)

PRISTIS ANTIQUORUM Shaw.

Passable description (of the saw only).

‡ XXXVIII. Genus, HORNFISH, PROCEROS, Proceros. (p. 87.)

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* Breadth one-sixth of the length, brownish, pale beneath; *head small obtuse with a large silver spot on the forehead before the eyes*, jaws nearly equal; *dorsal fin opposed to the anal, tail oboval entire.*

It is found in the *Cumberland River* and the Little River, a branch of it. Communicated by Mr. Wilkins. It is rather doubtful whether it belongs to this genus, or *Minilus, Rutilus*, &c. It might perhaps be found to constitute a peculiar one by the small mouth without lips, and the posterior dorsal fin. Vent posterior. *Pectoral and abdominal fins oboval.* Eyes large. Length 3 inches; good bait for Perch, Bass, Red-eyes or Ring-eyes, &c.

† Entirely silvery, without bands or spots.

Communicated by Mr. Owings. It is found in Licking River, Slate Creek, &c. Length from two to three feet. It is called Pike, and may be one, but as it is described without scales and very slender, I have added it to this genus until it is better known.

‡ Apodal. Body elongated. Vent posterior. One dorsal fin opposed to the anal. Mouth beneath transversal toothed. Snout protruded in a straight horn. Four spiracles or branchias on each side.

Singular new genus of the family of Sharks or *Antacea*, from which however it differs by the want of abdominal fins. There are two species of it; the second, which I have called *Proceros vittatus*, lives in Lake Ontario, and has longitudinal stripes.

*111th species, Spotted Horn-Fish, **PROCEROS MACULATUS**, Proceros tachete. (p. 87.)

A myth; description evidently second hand. What fish, if any, suggested it is past my guessing.

IV.—LIST OF SPECIES NOT NOTICED BY RAFINESQUE.

The following species occurring in the valley of the Ohio, most of them within a radius of one hundred miles from Lexington, do not seem to have been noticed by Rafinesque. These species are given upon the authority of the present author unless otherwise noted. In case no particular locality is mentioned, the species is supposed to be generally diffused. Various other nominal species have been described from the Ohio Valley, but I omit all of whose validity I am not reasonably certain.

Microperca punctulata Putnam.—White River, Indiana.
Boleichthys eos Jordan & Copeland.—Wabash River.
Pœcilichthys variatus (Kirt.) Ag.—Everywhere.
Pœcilichthys spectabilis Ag.
Nanostoma zonalis (Cope) Jor.—Miami River (Cope).
Nothonotus camurus (Cope) Jor.
Nothonotus sanguifluus (Cope) Jor.—Cumberland River (Cope).
Nothonotus maculatus (Kirt.) Ag.
Pleurolepis pellucidus Ag.
Alvordius aspro Cope & Jordan.
Ericosma evides Jordan & Copeland.—White River.
Rheocrypta copelandi Jor.—White River.
Imostoma shumardii (Grd.) Jordan.—Wabash River.
Diplesium simoterum (Cope) Copeland.—Rock Castle River.
Alvordius phoxocephalus (Nelson) Cope & Jor.—Wabash River.
Percina manitou Jor.—Wabash River.
Sandrus canadensis (Smith) Jor.—Ohio River. Introduced.
Stizostethium vitreum (Mit.) Jord.—Ohio River. (Introduced.†)
Morone interrupta Gill.—Lower Ohio.
Centrarchus irideus (Lac.) C. & V.—Lower Ohio.
Pomoxys nigromaculatus (Le Suer) Grd.—White River. Scarce.

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* Iron grey, with white spots on the sides; tail forked; horn one-fourth of total length.

This fish lives in the Mississippi, and is sometimes caught at St. Genevieve, in the State of Missouri. The French settlers call it *Poisson arme*. It has no scales, but its head is bony. Eyes very small. Dorsal and anal fins rounded. Length 2 or 3 feet; very good to eat. Communicated by Mr. M——, of St. Genevieve.

Chænobryttus gulosus (C. & V.) Cope.—Wabash River.
Lepiopomus pallidus (Mit.) Gill & Jord.—Everywhere.
Lepiopomus anagallinus (Cope.)—Salt River, Kentucky.
Xenotis inscriptus (Ag.) Jor.—White River.
Xenotis aureolus Jor.
Eupomotis pallidus (Ag.) Gill & Jor.—Lower Ohio.
Eupomotis aureus (Walb.) Gill & Jor.—Introduced. (?)
Asternotremia isolepis Nelson.—Southern Illinois.
Aphododerus cookianus Jordan.—Wabash River.
Potamocottus bairdii (Grd.) Gill.—Muskingum River. (Grd.)
Potamocottus carolinæ Gill.—Cave Region, etc.
Potamocottus wilsoni (Grd.) Gill.—White River.
Lota lacustris (Walb.) Gill.—Rare. Introduced. ?
Labidesthes sicculus Cope.—Abundant.
Zygonectes dispar Ag.—Wabash River.
Fundulus diaphanus (Le S.) Ag. (?)
Melanura limi (Kirt.) Ag.—Scarce.
Amblyopsis spelæus Dek.—Caves.
Typhlichthys subterraneus Grd.—Caves.
Chologaster agassizii Putnam.—Caves.
Percopsis guttatus Ag.—Rare. (Introduced. ?)
Exoglossum maxillingua (Le S.) Hald. (? ?)
Hybognathus argyritis Grd.
Hybognathus nuchalis Ag.
Ericymba buccata Cope.—Abundant.
Nocomis dissimilis (Kirt.) Cope & Jor.—Common.
Rhinichthys obtusus Ag.—Common.
Phenacobius teretulus Cope.—West Virginia. (Cope.)
Phenacobius uranops Cope.—Rock Castle River.
Luxilus storerianus (Kirt.) Jordan—Kentucky. (Grd.)
Luxilus stramineus (Cope) Jordan.—White River.
Luxilus tuditanus (Cope) Jordan.—Wabash River. (Cope.)
Luxilus galacturus (Cope) Jordan.—Abundant.
Luxilus coccogenis (Cope) Jordan.—Cumberland River.
Cliola scabriceps (Cope.) Jor.
Cliola ariomma (Cope) Jor.—White River, etc.
Cyprinella analostana (Grd.) Jordan.
Photogenis spilopterus Cope.—Wabash River.

Nototropis photogenis (Cope) Jor.—Ohio R.
Nototropis rubrifrons (Cope) Jor.—Abundant.
Nototropis rubellus (Ag.) Jor.—Abundant.
Nototropis dilectus (Grd.) Jor.—Falls of Ohio.
Nototropis micropteryx (Cope) Jor.—Rock Castle River.
Myxostoma breviceps Cope.—Ohio River.
Placopharyx carinatus Cope.
Carpiodes bison Ag.
Carpiodes difformis Cope.
Carpiodes cutisanserinus Cope.
Bubalichthys bubalinus Jor. (*Cat. bubalus* Kirt. not of Raf.)
Icthælurus furcatus (Val.) Gill.
Ichthaelurus robustus Jor.
Amiurus natalis (Le S.) Gill.
Noturus miurus Jordan.
Noturus liacanthus Jor.
Noturus lemniscatus (Le S.) Grd.—Ohio.
Noturus exilis Nelson.—Southern Illinois.
Amia calva L.
Ammocœtes argenteus (Kirt.) Jor.—Common.

TO GENERIC NAMES REFERRED TO IN THIS PAPER.

Department of the Interior:

U. S. NATIONAL MUSEUM.

— 10 —

BULLETIN

OF THE

ED STATES NATIONAL MUSEUM.

CONTRIBUTIONS TO NORTH AMERICAN ICHTHYOLOGY, NO. 2.

BY

DAVID S. JORDAN.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1877.

Department of the Interior:

U. S. NATIONAL MUSEUM.

10 —

LLETIN

OF THE

TED STATES NATIONAL MUSEUM.

No. 10.

PUBLISHED UNDER THE DIRECTION OF THE SMITHSONIAN INSTITUTION.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1877.

ADVERTISEMENT.

This work is the tenth of a series of papers intended to illustrate the collections of natural history and ethnology belonging to the United States and constituting the National Museum, of which the Smithsonian Institution was placed in charge by the act of Congress of August 10, 1846.

It has been prepared at the request of the Institution, and printed by authority of the honorable Secretary of the Interior.

JOSEPH HENRY,

Secretary of the Smithsonian Institution.

CONTRIBUTIONS

TO

NORTH AMERICAN ICHTHYOLOGY

BASED PRIMARILY ON THE

COLLECTIONS OF THE UNITED STATES NATIONAL MUSEUM.

II.

A.—Notes on *Cottidæ*, *Etheostomatidæ*, *Percidæ*, *Centrarchidæ*, *Aphododeridæ*, *Dorysomatidæ*, and *Cyprinidæ*, with revisions of the genera and descriptions of new or little known species.

B.—Synopsis of the *Siluridæ* of the fresh waters of North America.

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COTTIDÆ.

1. COTTOPSIS SPILOTUS, (*Cope*) *Jor.*

Uranidea spilota, COPE, Proc. Ac. Nat. Sci. Phila. 1865, 82.
Cottopsis ricei, NELSON, Bull. Ills. Trans. Nat. Hist., 1876.—JORDAN, Proc. Ac. Nat. Sci. Phila. 1877, 61.

An examination of the types of *U. spilota* shows their probable identity with Mr. Nelson's species as above indicated. Prof. Cope's specimens are in bad condition, and have lost the peculiar dermal spines. Prof. Gill thinks that *Cottopsis spilotus* and *Cottopsis semiscaber* Cope are not truly *Cottopsis*, the only species properly referable to that genus, being *C. asper* Rich. (of which *C. parvus* Grd. is the young). At any rate, *C. spilotus* and *C. semiscaber* form a well-marked group or section intermediate between *Cottopsis* and *Potamocottus*.

ETHEOSTOMATIDÆ.

2. AMMOCRYPTA BEANII, *gen. et sp. nov.*

Generic characters.—Allied to *Pleurolepis* Agassiz. Body greatly elongated, subcylindrical, and translucent. Head as in *Pleurolepis*, but

entirely naked; body *entirely naked, except* the *caudal peduncle,* which is sparsely covered with thin, imbedded scales, and a *series of rather large scales* along the sides, *on which the lateral line runs;* upper jaw somewhat protractile; mouth rather wide, nearly terminal; *a single anal spine.* The name *Ammocrypta* is given in allusion to the habit of hiding in the sand, which is characteristic of the species of this genus and *Pleurolepis.*

Specific characters.—General form of *Pleurolepis pellucidus,* but the head heavier. Depth about 6 in length (to base of caudal—as in all cases in this paper); head $3\frac{3}{4}$; mouth large, the upper jaw rather longest, and somewhat protractile; cheeks and opercles entirely naked. A series of rather large scales, about 65 in number, forming the lateral line; a few scattering scales immediately above or below lateral line; behind anal and second dorsal, the caudal peduncle is covered with small, thin, imbedded scales.

Fin rays: Dorsal X—10. Anal I, 9. The two dorsal fins very high, wide apart, about equal to each other and to the large anal. Caudal fin emarginate.

Color clear translucent, without bars or spots, the lateral line shining-golden in life (*Bean*). Spinous dorsal fin with a large black spot on the membrane anteriorly, another near the middle, and some small ones behind; other fins with their membranes dusted with small punctulations.

Habitat.—Notalbany River, near Tickfaw, La. Collected in December, 1876, by Dr. Tarleton H. Bean, of the Smithsonian Institution, for whom the species is named. The type—about $2\frac{1}{2}$ inches in length—is in the United States National Museum.

The much greater height of the dorsal and anal fins, as well as the generic character of the naked body, distinguish this species from its sand-diving relatives, *Pleurolepis pellucidus* and *P. vitreus.*

3. NANOSTOMA, *Putnam,* MSS., *gen. nov.*

The name of *Nanostoma,* a manuscript genus of Darters, has been current in ichthyological circles for some time, and it has once or twice appeared in print, but no attempt has ever been made to characterize it. I find in the National Museum two species of Etheostomoid fishes, labelled by Prof. Putnam *Nanostoma,* one of which seems to be identical with *Pœcilichthys zonalis* Cope. These species cannot well be referred to *Pœcilichthys,* as they have a complete lateral line. From

Boleosoma they are separated by the non-protractile upper jaw, and they seem to have little relation with the species referred to *Nothonotus*.

Nanostoma, then, appears to be a distinct genus, or at least a strongly marked section, and I propose to accept the name and to select, as the type of the group, *P. zonalis* Cope (= *N. pictum* Putnam, MSS.). *Nanostoma* bears somewhat the same relation to *Nothonotus* that *Boleichthys* does to *Pœcilichthys*.

Generic characters.—Body fusiform, little compressed, entirely scaly, without enlarged ventral plates. Mouth small, subinferior, the upper jaw not protractile; vomerine teeth; scales large; lateral line complete; cheeks and opercles scaly; dorsals well separated, the second much larger than anal, higher but rather shorter than spinous dorsal. The separation of the dorsals, the form of the body, the small size of the mouth, and the large size of the scales separate *Nanostoma* from *Nothonotus*. The scaliness of the cheeks, neck, and throat are differences of some importance.

4. HADROPTERUS TESSELLATUS, *sp. nov.*

? *Boleosoma tessellatum*, THOMPSON, Appendix Hist. Vt. p. 31, 1853 (not of De Kay, 1842).
? *Cottogaster tessellatus*, PUTNAM, Bull. Mus. Comp. Zool. i, 1863, 5.
? *Boleosoma tessellatum*, THOMPSON, *nec* De Kay, Jordan & Copeland, Bull. Buff. Soc. Nat. Hist. 1876, 135, 163.—JORDAN, Man. Vert. 1876, 222.

A specimen of an Etheostomoid in the United States National Museum, labelled *Cottogaster*, has the characters assigned by Prof. Putnam to his genus of that name, and is presumably the species which he catalogues, without description, as *C. tessellatus*. Prof. Putnam accepted the specific name from Thompson, who seems to have supposed, erroneously, that he was describing De Kay's *Boleosoma tessellatum*. Prof. Putnam states that his *Cottogaster tessellatus* is a species of *Boleosoma*, but the species now under consideration is certainly a *Hadropterus*, as I understand the latter genus. I therefore propose for my species the name of *Hadropterus tessellatus* Jordan. If Prof. Putnam's species proves different, it should be renamed, as there has been already a *tessellatum* in *Boleosoma*, and mine will keep its name. If the two are, as I suspect, identical, then we will write *Hadropterus tessellatus* (Putnam) Jordan, and no confusion in nomenclature need arise.

H. tessellatus has the form of *Imostoma shumardii*, fusiform, with a broad, heavy head; mouth wide, the upper jaw rather longest, not protractile; cheeks and opercles naked (? in life); chest naked; neck

scaly; no ventral plates; belly entirely scaled; lateral line complete; anal about equal to second dorsal.

Fin rays:—Dorsal about X—12. Anal II, 8. The soft rays barred. Coloration otherwise obliterated. Length of type 2½ inches.

Habitat.—Foxburgh, Pa., Allegheny River. Type No. 1199, United States National Museum.

5. ERICOSMA EVIDES, *Jordan & Copeland, gen. nov.*

Alvordius evides, JORDAN & COPELAND, Proc. Acad. Nat. Sci. Phila 1877, p. 51.

The coloration of this species, described in the paper above cited, is that of the female fish. The recent collection of a very large number of both sexes, in the breeding dress, at the same locality where the types were taken, enables me to supplement the original account. The following are the life colors of a male fish in spring:—

Lateral bars, which in the female are black or brown, a dark, rich blue-green, with metallic lustre. At the base of the bars they are somewhat connected by a narrow band of a greenish-bronze color, passing below the lateral line. Just below this is a narrow streak of yellowish—a sort of luminous, sunshine color. Above, toward the back, in each of the interspaces between the bars, is a bright blotch of bronze-red. The entire lower parts of the body are of a bright clear yellow, which becomes on the under side of the head, throat, and branchiostegals a very bright orange-red. A blackish-green bar below eye and a streak forward from it.

Dorsal fin orange-colored, with a bright bronze edge, a blackish spot on the last rays. Second dorsal and caudal pale orange; two luminous spots at base of caudal fin; anal bronze, with blue-black shading. Ventral fins dark blue-black. Pectorals faintly orange. Cheeks orange-red, exactly the color of bright iron-rust.

Males with the rays of the ventral and anal fins covered with small bluish tubercles, exactly as in some *Cyprinidæ*.

This species is probably not strictly congeneric with the type of *Alvordius*. It differs from the latter genus chiefly in the less complete dentition and the reduced number of vertebræ, the latter character giving to the fish a short, compact form, quite unlike that of *Alvordius aspro* and related species. I propose to designate the group typified by *A. evides* by the name of *Ericosma* (ηρ, springtime; κοσμεω, to adorn), from the gay coloration of the males at that season.

The principal characters separating *Ericosma* from *Alvordius* are shown below.

ALVORDIUS, *Grd.* (Type, A. *maculatus* Grd.)	ERICOSMA, *Jordan.* (Type, *Alvordius evides* Jor. & Copel.)
Vertebræ numerous, about 44 in all; 22 in front of anus.	Vertebræ fewer, about 39 in all; 17 in front of anus.
Body and head elongate; mouth wide, with well-developed teeth on vomer and on palatines.	Body short and compact; mouth small, with about six minute teeth on vomer and none on palatines.
Sexes similar; males never with the fins tuberculate.	Sexes dissimilar; the males brilliantly colored, with the lower fins tuberculate.
Dorsal spines 12 to 15; the two dorsal fins well apart.	Dorsal spines 10 or 11; the two fins contiguous.
Caudal fin slightly emarginate.	Caudal fin deeply emarginate.

6. RHEOCRYPTA, *Jordan, gen. nov.*

Allied to *Imostoma* and *Alvordius*. Body rather slender and elongate, with a pretty large, rather long, and somewhat narrowed head, resembling that of *Boleosoma;* mouth small, horizontal, subinferior, with weak teeth in the jaws, five or six small teeth on the vomer, and none on the palatines; upper jaw protractile, separated by a distinct furrow from the forehead; two distinct dorsal fins, of which the second is rather smaller than the first and than anal; anal with two distinct spines; ventral region with a series of enlarged plates, as in *Alvordius* and *Percina*, these caducous, in many specimens replaced by a scaleless strip; cheeks naked; opercles with a few scales; lateral line complete.

This genus is perhaps nearest *Imostoma*, with which it agrees in the protractile mouth. It differs from *Imostoma* and agrees with *Alvordius* Grd. in the presence of ventral plates. The name *Rheocrypta* (ῥεώ, to flow rapidly—κρυπτος, concealed, *i. e.*, hiding in the rapids) is given in allusion to the peculiar habits of this interesting species.

7. RHEOCRYPTA COPELANDI, *Jordan, sp. nov.*

Head 4¼ in length; depth 5½; eye large, 3⅓ in head; scales moderate, strongly ctenoid, 56 in lateral line; those of the ventral much enlarged, forming serrated plates; cheeks naked; opercles with a few scales; neck and throat naked. Fin-rays:—Dorsal X–XII, 10; anal II, 9.

General color a semi-transparent brownish-yellow, a series of rather small horizontally oblong black spots along lateral line, forming an interrupted lateral band; back tesselated, as in *Boleosoma*, a blackish streak forward from eye and another downward; ventral fins dusky; vertical fins with dusky specks, but scarcely barred; a black spot on anterior rays of spinous dorsal.

Length of specimens 2 to 2½ inches.

Habitat.—White River, Indiana. The specimens in my possession, some thirty in number, were all taken at the same point, a shallow rapid, where the river flows over fine gravel. This locality, the "Red Bridge", about five miles north of Indianapolis, is the only one thus far known for this species and for *Ericosma evides*. It is the best point for the collection of *Pleurolepis pellucidus* which I know of in the West. As many as thirty specimens of the latter species have been taken there at low water at a single haul of the net. *Rheocrypta copelandi* and *Ericosma evides* are both extremely local, as a few rods above or below the rapids it is impossible to find either.

I dedicate this species to the memory of my friend, the late Professor Copeland, to whose patient study of these beautiful little fishes we owe much that is now known of their habits and ways. I have named this graceful species, taken at the rapids where he and I had so often fished together, for him, in recognition of his genuine love of nature, and in token of our long scientific association and personal friendship.

8. ARLINA ATRIPINNIS, *Jordan, sp. nov.*

I admit the genus *Arlina* provisionally for those species of *Boleosoma* which have two well-developed anal spines; but, as I have never seen *Arlina effulgens*, the type of the genus, I am not certain that that species possesses this character.

The species of this genus to which the above name has been given may be thus characterized:—

Body rather short for the genus, somewhat compressed behind; the depth 4½ in length. Head extremely short and deep, 4⅓ in length of body; the snout very short and bluntly rounded. Eye quite large, 3½ in head. Mouth quite small, with equal jaws, the upper protractile. Cheeks and opercles scaly, the scales on cheeks small and closely set; a triangular series of scales above the opercle behind the eye. Throat smooth; neck above closely scaly; no ventral plates; belly closely scaled.

Fins large; rays, dorsal XII, 10; anal II, 7. Base of spinous dorsal $1\frac{1}{3}$ times length of head, $3\frac{1}{5}$ in length; the spines high, the highest about $\frac{3}{4}$ the length of the head.

Dorsal fins contiguous, with a slight connecting membrane. Second dorsal higher, but smaller than first, its base about equal to the length of the head. Pectoral fins moderate, reaching past the middle of the dorsal.

Color olivaceous; head above entirely black; a black bar below eye; back with eight dark cross-blotches; about eleven bar-like blotches, somewhat indistinct, arranged along the lateral line. Fins chiefly black. Membranes of the second dorsal and ventral fins entirely black, that of spinous dorsal with a broad, black, horizontal bar at base, above which are numerous distinct black oblique streaks; anal with a broad black bar and caudal and pectorals largely dusky. It is likely that females, and male fish at other seasons, will be found to be paler in color.

Length of type-specimen $2\frac{1}{2}$ inches.

Collected in a tributary of the Cumberland River, near Nashville, Tenn., by Prof. A. Winchell, to whom the National Museum is indebted for a fine series of Tennessee fishes.

9. ETHEOSTOMA SQUAMICEPS, *sp. nov.*

Catonotus fontinalis, PUTNAM, MSS. (1860) (not *E. fontinalis* Raf.).

A species of the genus *Etheostoma*, found in the streams of Kentucky, has been for a long time indicated in manuscript, but has never yet been fully described.

The following account is taken from two fine specimens in the United States National Museum (No. 1345), collected by Dr. Bebb, at Russellville, Ky., and labelled *Catonotus fontinalis* by Prof. Putnam.

Body oblong, rather elongate, pretty strongly compressed, the general form being much like that of *E. flabellaris*, but with deeper caudal peduncle, the depth being about one-fifth of the length. Head large, $3\frac{1}{8}$ in length, shorter and stouter than in *E. flabellaris;* the jaws much shorter and exactly equal; eye rather large, $4\frac{1}{2}$ in head. Cheeks and opercles thickly scaly, as are the throat and region in front of the dorsal; middle line of the belly with ordinary scales. Lateral line almost complete, wanting on about ten of the posterior scales, but with occasional perforated scales behind the continuous series.

Scales about 5–50–6. Fin-rays:—dorsal IX (or VIII), 12; anal II, 7 or 8.

Spinous dorsal low and short, the spines about equal, the longest less than half the height of the soft rays of the second dorsal. The bases of the two fins are about equal, and they are slightly connected by membrane.

In the male specimen, the dorsal spines are somewhat swollen and white at their tips, but rather less so than is usual in the genus.

Color partly obliterated by the alcohol. The male is rather dark, not spotted, striped, or banded. The female is somewhat mottled, and has about six cross-blotches on the back. The second dorsal, caudal, and pectorals are barred with black and pale, the caudal especially so. The other fins are black in the male; in the female, the lower fins are pale. A large black humeral spot. Length 2¾ inches.

This species is technically an *Etheostoma*, of which genus it possesses the general form, fin coloration, and dorsal fin. It has the mouth of *Pœcilichthys*, the scaly head of *Nanostoma*, with a condition of the lateral line intermediate between *Pœcilichthys* and *Nanostoma*. The other species of *Etheostoma* have the head naked.

The specific name *fontinalis* was used by Prof. Putnam on the supposition that this species is identical with that described under the same name by Rafinesque.

ANALYSIS OF GENERA OF ETHEOSTOMATIDÆ.

The following analytical synopsis gives the characters at present assigned to the genera of *Etheostomatidæ* admitted in this paper. The categories recognized are very closely related, but are susceptible of definition:—

*. Lateral line complete; body much elongate, subcylindrical, pellucid, with at least the entire ventral region naked:

a. Body entirely naked, except the caudal peduncle and the lateral line; dorsal fins high, well separated, equal to the anal fin and to each other; a single anal spine; head entirely scaleless; mouth large, with vomerine teeth, the upper jaw subprotractile ..... AMMOCRYPTA, 1.

aa. Body covered above with small thin imbedded scales, the ventral region entirely naked, the dorsal scales obscure but present; dorsal fins small, wide apart; two anal spines; cheeks and opercles scaly; mouth large, with vomerine teeth, the upper jaw subprotractile ..... PLEUROLEPIS, 2.

**. Lateral line complete; body less elongate, entirely scaly, or with definitely naked areas on throat, neck, or ventral line:

†. Second dorsal not larger than spinous dorsal, and little, if any, larger than anal; the dorsal fins distinct, the first the longer and usually the larger; body little compressed; two distinct anal spines (except in *Alvordius peltatus*, a species of uncertain affinities):

b. Upper jaw not protractile; vomerine teeth present:

c. Mouth narrow, inferior, overlapped by a tapering, truncate, more or less pig-like snout; ventral plates present, or, if fallen, a naked strip; body elongated; cheeks and opercles scaly; size largest of all the darters, PERCINA, 3.

cc. Mouth wider, terminal, the upper jaw being but little longer than the lower:

d. Ventral plates developed, or, if fallen, middle line of belly with a naked strip:

e. Body and head elongate; the vertebræ in increased number, more than 20 in front of anus; well-developed teeth on vomer and palatines; dorsal spines 12 to 15; fins never tuberculate ..... ALVORDIUS, 4.

ee. Body and head shortened; vertebræ fewer, less than 20 in front of anus; a few minute teeth on vomer and none on palatines; dorsal spines 10 to 12; colors brilliant, the male in spring with the lower fins tuberculate, ERICOSMA, 5.

dd. Ventral plates not developed; middle line of belly scaled like the sides, HADROPTERUS, 6.

bb. Upper jaw protractile, a distinct furrow separating it from the skin of the forehead:

f. No ventral plates; posterior ventral region scaled; anterior region largely naked; vomer well toothed; head and body stout and heavy; cheeks and opercles scaly; anal fin (in adult males?) greatly elevated, reaching to base of caudal fin ..... IMOSTOMA, 7.

ff. Ventral plates well developed, or, if fallen, a naked strip; vomer with a few minute teeth; palatines naked; body rather slender, with rather narrow head and smaller subinferior mouth; cheeks naked; opercles scaly; anal fin not enlarged ..... RHEOCRYPTA, 8.

††. Second dorsal considerably larger than anal fin; no ventral plates, the middle line of the belly always covered with small scales like those of the sides:

g. Upper jaw protractile:

h. No teeth on vomer or palatines; mouth small, contracted, subinferior; head short and thick, with swollen cheeks; spinous dorsal rather long; cheeks and opercles scaly; anal spines strong; body elongated, little compressed, DIPLESIUM, 9.

hh. Vomerine teeth present; dorsals contiguous, but distinct; the spinous dorsal short; head narrowed; the mouth rather small, horizontal, subinferior:

i. Anal spines two, well developed; the first the longer ..... ARLINA, 10.

ii. Anal spine single, more or less obscure and undifferentiated from the soft rays ..... BOLEOSOMA, 11.

gg. Upper jaw not protractile:

j. Dorsal fins well apart; body fusiform, little compressed; scales large; cheeks and opercles scaly; mouth small, horizontal, subinferior (as in *Boleosoma*); caudal peduncle rather slender ..... NANOSTOMA, 12.

jj. Dorsal fins slightly connected at base; body rather short, deep, strongly compressed; scales small; cheeks naked; mouth rather large, oblique (as in *Pœcilichthys*); caudal peduncle deep ..... NOTHONOTUS, 13.

***. Lateral line incomplete or wanting; no ventral plates; upper jaw not protractile; second dorsal larger than anal; vomer with teeth:

k. Lateral line present on anterior part of body:

l. Dorsal fins contiguous, the membrane of the first reaching to the base of the second:

m. Spinous dorsal fin well developed, two-thirds or more the height of the second; the spines graduated, never ending in little fleshy knobs; lateral line extending more than half the length of the body; mouth moderate, the upper jaw usually a little the longer; opercles scaly; cheeks naked; body rather short and deep ..... PŒCILICHTHYS, 14.

mm. Spinous dorsal low and small, the spines subequal, scarcely half the height of the soft rays, in males ending in little fleshy knobs; mouth rather large, the lower jaw the longest; body elongated, compressed; lateral line extending less than half the length of the body; head naked (except in the aberrant *E. squamiceps*, which is an exception to all these characters, save those drawn from the dorsal fin).....ETHEOSTOMA, 15.

ll. Dorsal fins about equal, well separated; body elongated; cheeks and opercles scaly:

n. Lower jaw longest; lateral line unknown (genus admitted provisionally, the type-species apparently has not been seen since its original description): ALVARIUS. 16.

nn. Jaws about equal; lateral line curved upward over the pectorals, not reaching to middle of body; body elongated.....BOLEICHTHYS, 17.

kk. No lateral line; dorsal fins small, subequal, well separated; mouth small, with nearly equal jaws; scales large; size smallest of all spiny-rayed fishes, MICROPERCA, 18.

CATALOGUE OF SPECIES OF ETHEOSTOMATIDÆ.

The following catalogue includes those species of *Etheostomatidæ* which appear to be valid, with the geographical distribution of each so far as recorded. Species unknown to me are indicated by a star (*). In arranging the genera, I begin with the type most generalized, or most like ordinary *Percidæ*, *Hadropterus*. The relations of the aberrant genera *Pleurolepis* and *Ammocrypta* are probably most with *Alvordius*, a fact which cannot well be shown in a linear series. I omit several species, which very likely may prove valid, but of whose relations I can form no definite opinion from the published accounts. In each genus, the type-species is placed first.

HADROPTERUS, *Agassiz.*

1. Hadropterus nigrofasciatus, Ag.—South Carolina to Tennessee and Louisiana.
2. Hadropterus tessellatus, Jordan.—Vermont (?) to Pennsylvania.
3. Hadropterus aurantiacus, (Cope) Jor.*—Virginia to Tennessee.

ERICOSMA, *Jordan.*

4. Ericosma evides, Jordan & Copeland.—Wabash Valley.

ALVORDIUS, *Girard.*

5. Alvordius maculatus, (Grd.).—Pennsylvania to North Carolina.
6. Alvordius aspro, Cope & Jordan.—Upper Mississippi Valley and Upper Lake Region.
7. Alvordius nevisensis, Cope.*—North Carolina.

8. Alvordius peltatus, (Stauffer,) Cope & Jor.*—Conestoga River, Pennsylvania.
9. Alvordius macrocephalus, Cope.—Upper Ohio Valley.
10. Alvordius phoxocephalus, (Nelson) Cope & Jordan.—Indiana to Tennessee and Kansas.

PERCINA, *Haldeman.*

11. Percina caprodes, (Raf.) Grd.—Great Lake Region to Alabama.
12. Percina carbonaria, (B. & G.) Grd.—Texas.
13. Percina zebra, Agassiz.—Great Lake Region (*d. s.*).
14. Percina manitou, Jordan.—Indiana to Minnesota.

RHEOCRYPTA, *Jordan.*

15. Rheocrypta copelandi, Jordan.—Wabash Valley.

IMOSTOMA, *Jordan.*

16. Imostoma shumardii, (Grd.) Jor.—Indiana to Iowa and Arkansas.

DIPLESIUM, *Rafinesque.*

17. Diplesium blennioides, Raf.—Mississippi Valley.
18. Diplesium newmani, (Ag.) Jor. & Copel.—Tennessee River.
19. Diplesium simoterum, (Cope) Copeland.—Cumberland and Upper Tennessee Rivers.

BOLEOSOMA, *De Kay.*

20. Boleosoma olmstedi, (Storer) Ag.—Great Lakes to New England and south to Georgia, east of the Alleghanies.
21. Boleosoma atromaculata, (Grd.) Jor.—New York to Virginia (? var.).
22. Boleosoma nigra (Raf.) Jor.—Mississippi Valley and Upper Great Lakes.
23. Boleosoma æsopus, Cope.*—Alleghany River.
24. Boleosoma mesæa, (Cope) Jordan.—Kansas (*d. g.*).

ARLINA, *Girard.*

25. Arlina effulgens, Grd.—Maryland to North Carolina (*d. g.*).
26. Arlina stigmæa, Jordan.—Georgia to Louisiana.
27. Arlina maculaticeps, (Cope) Jordan* (*d. g.*).
28. Arlina atripinnis, Jordan.—Cumberland River.

NANOSTOMA, *Putnam.*

29. Nanostoma zonalis, (Cope) Jordan.—Mississippi Valley.

NOTHONOTUS, *Agassiz.*

30. Nothonotus maculatus, (Kirt.) Ag.—Ohio.
31. Nothonotus camurus, (Cope) Jor.—Ohio Valley.
32. Nothonotus sanguifluus, (Cope) Jor.*—Cumberland River.
33. Nothonotus vulneratus, (Cope) Jor.*—Tennessee to North Carolina (*d. g.*).
34. Nothonotus rufilineatus, (Cope) Jordan.*—Kentucky to North Carolina.

PŒCILICHTHYS, *Agassiz.*

35. Pœcilichthys variatus, (Kirtland) Ag.—Upper Mississippi Valley and tributaries of Lake Erie and Lake Michigan.
36. Pœcilichthys spectabilis, Agassiz.—Upper Mississippi Valley and tributaries of Lakes Erie and Michigan.
37. Pœcilichthys lepidus, Girard.—Texas and west.
38. Pœcilichthys punctulatus, Agassiz.—Missouri to Arkansas.
39. Pœcilichthys leonensis, (Grd.) Jor. & Copel.*—Texas (*d. g.*).
40. Pœcilichthys grahami, (Grd.) Jor. & Copel*.—Texas.

ETHEOSTOMA, *Rafinesque.*

41. Etheostoma flabellaris, Rafinesque.—Ohio Valley to Tennessee and Virginia.
42. Etheostoma linslii, H. R. Storer.—Western New York (? var).
43. Etheostoma kennicottii, (Putnam) Jor.*—Illinois (*d. s.*).
44. Etheostoma lineolata, (Agassiz) Jordan.—Wisconsin to Iowa (? var.).
45. Etheostoma squamiceps, Jordan.—Ohio Valley, Kentucky.

ALVARIUS, *Girard.*

46. Alvarius lateralis, Grd.*—Texas, Mexico.

BOLEICHTHYS, *Girard.*

47. Boleichthys exilis, Grd.*—Upper Missouri Region.
48. Boleichthys eos, Jordan & Copeland.—Tributaries of Great Lakes and Upper Mississippi River.
49. Boleichthys erochrous, (Cope) Jordan.—New Jersey, Pennsylvania.
50. Boleichthys elegans, Girard.—Georgia to Texas.

51. Boleichthys gracilis, (Grd.) Jordan.—Texas.
52. Boleichthys fusiformis, (Grd.) Jordan.—Massachusetts.
53. Boleichthys barratti, (Grd.) Jordan.—North Carolina to Georgia.
54. Boleichthys warreni, Grd.*—Upper Missouri.

MICROPERCA, *Putnam.*

55. Microperca punctulata, Putnam.—Upper Mississippi Valley and tributaries of Lake Michigan.

PLEUROLEPIS, *Agassiz.*

56. Pleurolepis pellucidus, (Baird) Agassiz.—Ohio Valley.
57. Pleurolepis vitreus, (Cope) Jord. & Copel.*—North Carolina and Tennessee.

AMMOCRYPTA, *Jordan.*

58. Ammocrypta beanii, Jordan.—Louisiana.

Incertæ sedis.

Etheostoma tessellata, Storer.*—Florence, Ala. (*?Pœcilichthys*).
Etheostoma cinerea, Storer.*—Florence, Ala. (*?Pœcilichthys*).
Aplesion pottsii, Grd.*—Chihuahua, Mexico (*?Pœcilichthys*).
Diplesion fasciatus, Grd.*—Texas (*? Pœcilichthys*).

LIST OF NOMINAL SPECIES OF ETHEOSTOMATIDÆ.

The following list includes all the species of *Etheostomatidæ* described in works to which I have access, arranged in chronological order, with my identification of each. Those species of which I have examined the type-specimens are designated by a dagger (†).

Nominal species.	Date.	Identification.
Sciæna caprodes, Raf	1818	Percina caprodes.
Etheostoma flabellaris, Raf	1819	Etheostoma flabellaris.
Etheostoma blennioides, Raf	1819	Diplesium blennioides.
Etheostoma flabellata, Raf	1820	Etheostoma flabellaris.
Etheostoma nigra, Raf	1820	Boleosoma nigra.
Pegedictis ictalops, Raf	1820	Etheostoma flabellaris.
Etheostoma fontinalis, Raf	1820	Etheostoma flabellaris.
Etheostoma variata, Kirt	1840	Pœcilichthys variatus.
Etheostoma maculata, Kirt	1840	Nothonotus maculatus.
Etheostoma olmstedi, Stor	1842	Boleosoma olmstedi.
Perca nebulosa, Hald	1842	Percina caprodes.

Nominal species.	Date.	Identification.
Perca minima, Hald	1842	Boleosoma olmstedi.
Pileoma semifasciata, De Kay	1842	Percina caprodes.
Boleosoma tessellata, De Kay	1842	Boleosoma olmstedi.
Percina bimaculata, Hald	1843	Percina caprodes.
Etheostoma cœrulea, Stor	1845	Pœcilichthys variatus.
Etheostoma tessellata, Stor	1845	(?)
Etheostoma cinerea, Stor	1845	(?)
Pileoma zebra, Ag	1850	Percina (caprodes var.?) zebra.
Boleosoma maculatum, Ag.	1850	Boleosoma nigra.
Etheostoma linsleyi, H. R. Stor	1850	Etheostoma (flabellaris var.?) linsleyi.
Pœcilosoma erythrogaster, Kirt	1854	Pœcilichthys variatus.
Pœcilichthys spectabilis, Ag. †	1854	Pœcilichthys spectabilis.
Pœcilichthys versicolor, Ag	1854	Pœcilichthys variatus.
Pœcilichthys punctulatus, Ag †	1854	Pœcilichthys punctulatus.
Catonotus lineolatus, Ag	1854	Etheostoma (flabellaris var.?) lineolata.
Hadropterus nigrofasciatus, Ag	1854	Hadropterus nigrofasciatus.
Hyostoma newmani, Ag. †	1854	Diplesium newmani.
Boleosoma fusiforme, Grd. †	1854	Boleichthys fusiformis.
Boleosoma barratti, Holbr	1855	Boleichthys barrattii.
Pileoma carbonaria, B. & G. †	1856	Percina carbonaria.
Pœcilichthys lepidus, B. & G. †	1856	Pœcilichthys lepidus.
Arlina effulgens, Grd	1859	Arlina effulgens.
Estrella atromaculata, Grd	1859	Boleosoma (olmstedi var.?) atromaculata.
Oligocephalus humeralis, Grd	1859	Etheostoma flabellaris.
Alvordius maculatus, Grd. †	1859	Alvordius aspro.
Catonotus fasciatus, Grd	1859	Etheostoma flabellaris.
Hadropterus maculatus, Grd	1859	Alvordius maculatus.
Hadropterus shumardii, Grd	1859	Imostoma shumardii.
Alvarius lateralis, Grd	1859	Alvarius lateralis.
Diplesion fasciatus, Grd	1859	Pœcilichthys sp. (?)
Aplesion pottsi, Grd	1859	Pœcilichthys sp.
Oligocephalus grahami, Grd	1859	Pœcilichthys sp. (?)
Oligocephalus leonensis, Grd	1859	Pœcilichthys sp. (?)
Oligocephalus pulchellus, Grd	1859	Pœcilichthys sp. (?)
Boleosoma gracile, Grd. †	1859	Boleichthys gracilis.
Boleichthys exilis, Grd	1859	Boleichthys exilis.
Boleichthys whipplei, Grd	1859	Pœcilichthys punctulatus.
Boleichthys elegans, Grd	1859	Boleichthys elegans.
Boleichthys warreni, Grd	1859	Boleichthys warreni.
Pœcilosoma transversum, Abbott †	1860	Pœcilichthys variatus.
Pileoma cymatogrammum, Abbott †	1860	Diplesium blennioides.

Nominal species.	Date.	Identification.
a zebra, Heckel	1860	Percina caprodes.
kennicottii, Putn	1863	Etheostoma sp.
a punctulata, Putn.†	1863	Microperca punctulata.
er tessellatus, Putn	1863	Hadropterus tessellatus (?).
s pellucidus, (Baird) Ag	1863	Pleurolepis pellucidus.
ıys mesæus, Cope †	1864	Boleosoma mesæa.
ıa peltatum, Stauff	1864	Alvordius peltatus.
erochrous, Cope †	1864	Boleichthys erochrous.
ıa macrocephalum, Cope †	1866	Alvordius macrocephalus.
ı brevipinne, Cope †	1868	Boleosoma nigra.
er aurantiacus, Cope	1868	Hadropterus aurantiacus.
ıys zonalis, Cope †	1868	Nanostoma zonalis.
blennioperca, Cope †	1868	Diplesium blennioides.
simoterum, Cope	1868	Diplesium simoterum.
ıa nevisense, Cope	1870	Alvordius nevisensis.
ıys sanguifluus, Cope	1870	Nothonotus sanguifluus.
ıys camurus, Cope	1870	Nothonotus camurus.
hys rufilineatus, Cope	1870	Nothonotus (?) rufilineatus.
hys vulneratus, Cope	1870	Nothonotus (?) vulneratus.
hys vitreus, Cope	1870	Pleurolepis vitreus.
ı maculaticeps, Cope	1870	Arlina maculaticeps.
ı æsopus, Cope	1870	Boleosoma æsopus.
:a anceps, Le Vaillant	1873	Hadropterus nigrofasciatus.
ı mutatum, Le Vaillant	1873	Boleosoma nigra.
ys eos, Jordan & Copeland †	1876	Boleichthys eos.
ıa phoxocephalum, Nelson †	1876	Alvordius phoxocephalus.
evides, Jor. & Copel †	1877	Ericosma evides.
aspro, Cope & Jordan	1877	Alvordius aspro.
ıanitou, Jor. †	1877	Percina manitou.
ı stigmæum, Jor.†	1876	Arlina stigmæa.
pta beanii, Jor. †	1877	Ammocrypta beanii.
rus tessellatus, Jor. †	1877	Hadropterus tessellatus.
ta copelandi, Jor.†	1877	Rheocrypta copelandi.
ripinuis, Jor.†	1877	Arlina atripinnis.
na squamiceps, Jor	1877	Etheostoma squamiceps.

CENTRARCHIDÆ.

10. EUPOMOTIS.

Eupomotis, GILL & JORDAN, Field and Forest, 1877, v. 2, p. 190.

In the Journal de Physique, June, 1819, page 420,* Rafinesque first proposes the name *Lepomis* for the American Sunfishes, the type to be *Labrus auritus* of authors. The genus *Lepomis* he then proposes to divide into two subgenera, *Pomotis* and *Apomotis*, the former having the body rounded and the opercle auriculated, the latter having the body rounded or oblong and the opercle without auricle.

Of auriculated species, only one, *auritus*, is mentioned. This species is then obviously the type of *Pomotis;* but it had been already indicated as the type of *Lepomis*. *Pomotis* then is typical *Lepomis*, and is a simple synonym of the latter name.

In the Ichthyologia Ohiensis, in 1820, Rafinesque characteristically changed some of these names; *Lepomis* here becomes *Icthelis*, and *Apomotis*, *Telipomis*. *Pomotis* is still used in the same sense as before. In 1829, Cuvier and Valenciennes revived the name *Pomotis* of Rafinesque in precisely the same sense in which Rafinesque used it, but including several additional species. Cuvier does not credit the name *Pomotis* to Rafinesque, but, in accordance with a custom then as now too prevalent, in modifying the characters assigned to the genus, allowed his own name to supersede that of the earlier author. That Cuvier accepted the name *Pomotis* from Rafinesque is evident from the fact that he quotes Rafinesque's descriptions in a foot-note. *Pomotis* and *Bryttus* of Cuvier and Valenciennes are practically equivalent to *Po-*

*"13. *Lepomis* (Thoracique). Corps arrondi, ovale ou oblong, très comprimé. Tête et opercules écailleux, ceux-ci mutiques, le postérieur flexueux, membraneux, quelquefois auriculé. Bouche petite, mâchoire à petits dents, lèvre supérieure à peine extensible. Une nageoire dorsale; nageoire thoracique à 6 rayons dont 1 épineux sans appendices. Anus au milieu. Ce genre est nombreux en espèces, je'n connois 7 à 8 des États-Unis; son type est le *Labrus auritus* des auteurs, sous le nom duquel il y a 4 ou 5 espèces confondues. Il diffère particulièrement du Sparus par son opercule écailleux et le défaut d'appendice thoracique. Il se devise en deux sous-genre: 1. *Pomotis*. Corps arrondi, opercule auriculé. 2. *Apomotis*. Corps arrondi ou oblong, opercule sans auricule; mais tous ont le corps tacheté et une tache noire sur l'opercule. J'en ai découvert deux nouvelles espèces dans l'Ohio. 1. *L. cyanellus*. Corps oblong, tout couvert de points bleus, joues à lignes flexueuses bleues, opercule sans auricule; tache oblongue, queue bilobée. 2. *L. macrochirus*. Corps ovale, points bruns, point d'auriculé; tache oblongue, toute noire; pectorales très longues atteignant l'anale; queue fourchée."—(RAFINESQUE.)

tis and *Apomotis* of Rafinesque. The fact that *Pomotis* has been long use and is a very familiar name is its only claim for retention, a im which does not appear to justify its retention in opposition to ablished rules of nomenclature.

The name *Pomotis* being therefore untenable for any genus of *Cen-rchidæ*, Prof. Gill and myself have proposed the name *Eupomotis* for *zrus aureus* Walbaum (=*Pomotis vulgaris* Cuvier) and its congeners. Three species of this genus are known from autopsy to Prof. Gill and self—*E. aureus* (Walb.), *E. speciosus* (Holbrook), and *E. pallidus* gassiz).

11. EUPOMOTIS PALLIDUS, (*Agassiz*) *Gill & Jordan.*

notis pallidus, AG., Am. Journ. Sci. Arts, 1854, 303.—JORDAN, Man. Vert. 1876, 240.

This is a large stout species, somewhat elongate, resembling *Lepiopo-s pallidus* in form and coloration. Head 3 in length; depth 2⅛; eye 4. ad and profile scarcely gibbous; snout protruding; mouth rather ge, somewhat oblique, reaching the front of eye; eye rather large; rcular flap wide and rounded, shorter than in *E. aureus*, with a her wide pale border, chiefly below and behind. Scales very large, 5–13, about 4 rows on the cheeks. Spines rather high and strong, longest dorsal spine as long as from muzzle past middle of pupil; t fins high; pectorals long, but not reaching anal. Gill-rakers short l weak.

Color pale olive or brassy; no trace of blue or orange in spirits; some ckish markings on last rays, but hardly a spot. Pharyngeal teeth y strongly "paved", as in the related species. Described from No. 7, National Museum.

Habitat.—Tennessee River (Agassiz). Mississippi River, at Saint is; Alabama River (specimens in National Museum).

12. XENOTIS.

otis, JORDAN, Proc. Acad. Nat. Sci. Phila. 1877, 76.

The peculiar character of the gill-rakers, which separates this genus m *Lepiopomus*, has not yet been fully defined, and indeed a more minute dy is still desirable, although it may be readily recognized. In *Lepio-mus*, the gill-rakers of the anterior branchial arch are comparatively g, somewhat firm, having apparently an ossified basis, and they are vided toward their tip, on one side at least, with minute, pointed, th-like roughnesses. These teeth may be readily felt with the

tweezers or seen with a hand-glass. The appendages of the anterior gill-arch only are thus enlarged, those of the other arches remaining undeveloped.

In *Xenotis*, the gill-rakers are not essentially dissimilar on the different arches. They are short, comparatively thick, soft, having a cartilaginous or unossified basis, and are nearly destitute of teeth or tooth-like roughnesses. The brilliant colors, low dorsal spines, and especially the great development of the opercular flap in *Xenotis*, form additional distinctive characters, although not independently of generic value.

13. XENOTIS SOLIS, (*Valenciennes*) *Gill & Jordan.*

Pomotis solis, *VALENCIENNES (1831), Hist. Nat. des Poissons, vii, 468. (Specimens sent by Le Sueur from near New Orleans. Those referred to from New York doubtless belong to *Lepiopomus auritus*.)

Numerous specimens of a sun-fish from the Tangipahoa River, Louisiana, have been identified by us with Valenciennes's species as above, and examples have been distributed by the United States National Museum under the name of *Xenotis solis*. Of course, it is not possible from Valenciennes's description to know certainly which one of our numerous similar species he had in mind, but it is safer to identify with the present species than with any other, and our *X. solis* does not seem ever to have received any other name.

Xenotis solis is an elongate species for the genus, most of the species of which are short and deep. It is, however, heavy forward, the region before the dorsal being quite prominent, forming a marked angle over the eye with the rising profile of the face. The greatest depth is $2\frac{1}{3}$ in the length. The head is large, 3 in length, without the opercular flap; $2\frac{1}{3}$ including the flap.

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* The following is Valenciennes's description :—

Le POMOTIS SUN-FISH (*Pomotis solis nob.*).

Un autre pomotis du lac Pontchartrain, envoyé par M. Le Sueur, pourrait bien encore être d'une espèce distincte.

La couleur parait d'être un jaune verdâtre uniform, plus ou moins doré, sans aucune trace de taches ou de raies sur le corps et sur les nageoires. Le lambeau de l'oreille est plus long et plus étroit que dans aucun autre. Les nombres sont, D. 10-11: A. 3-10, etc.

Il est long de quatre à cinq pouces.

Les Anglo-Américains de la Nouvelle-Orléans donnent à cette espèce le nom de *sunfish* (poisson de soleil). M. Le Sueur ne nous explique pas ce qui a motivé cette dénomination.

Nous rapportons à cette espèce des individus mal colorés, qui nous ont été envoyés de New York par M. Milbert.

The eye is quite large, 4 in the head proper; 1½ times in the opercular flap.

The opercular flap is quite long and narrow, narrowly bordered with pale throughout its length; its length is contained about 2½ times in the length of the rest of the head, its width is little more than half its length. It is somewhat broadened toward the tip, and is set obliquely upward and backward. Much variation in the size and form of this appendage may be expected.

The dorsal spines are moderately developed, rather high for the genus, the longest as long as from snout to middle of orbit. The caudal peduncle in this species is rather more than usually elongate: with the caudal fin it forms about one-third of the total length.

The scales on the cheek are rather large, in five or six rows. There are 39 scales in the lateral line; about five rows above and eleven below it. Fin-rays as usual, D. X, 10; A. III, 9.

The coloration has been modified by the alcohol. It seems to have been chiefly of a greenish or golden orange in life, with numerous small pale blue spots. Blue lines on the sides of the head and in front of the eyes. The fins, now unicolor, were probably largely orange in life.

This species is related to *X. inscriptus* and *X. megalotis*. It is longer-bodied and has higher spines than *fallax*, *breviceps*, *megalotis*, and *sanguinolentus*.

Its spines are much higher than in *lythrochloris* and the flap is different. *X. inscriptus*, *aureolus*, *marginatus*, and *peltastes* are smaller, less elongate, and have a different flap. In some respects it approaches nearer *Lepiopomus auritus* than do any of the above species, and specimens of the *auritus* were apparently confounded with it by Valenciennes.

14. XENOTIS SANGUINOLENTUS, (*Agassiz*) *Jordan*.

Pomotis sanguinolentus, AGASSIZ, Am. Journ. Sci. Arts, 1854, 301.

This handsome species seems to be widely distributed in the Southern States; I have seen specimens from the Tennessee, Savannah, Alabama, and Mississippi Rivers. It represents, in the South, *X. megalotis* of the Northern States. *X. sanguinolentus* may be known by the rather higher spines—the longest as long as from snout just past middle of pupil—and by a peculiarity of coloration, blue spots on the sides being arranged in vertical chain-like bands, which are striking and conspicuous even after the fish has been long in alcohol.

15. XYSTROPLITES, *gen. nov.*

This genus bears nearly the same relation to *Eupomotis* that *Lepiopomus* does to *Xenotis*. It comprises those *Centrarchidæ* which, wanting the supernumerary maxillary bone, have the teeth of the lower pharyngeals blunt and paved as in *Eupomotis*, and the gill-rakers long and relatively slender as in *Lepiopomus*. The pharyngeal bones themselves are much narrower and smaller than in *Eupomotis*, being in form more like those of *Xenotis*. The teeth are less strongly "paved", being smaller, less crowded, and rounded rather than truncate; on the inner border of the bone are a few enlarged acute teeth. The species of *Xystroplites*, as of *Eupomotis*, have the short rounded ear-flap bordered below and behind with orange. The type is the species below described under the name of *Xystroplites gillii*. *Pomotis heros* B. & G. also belongs to this genus. The known species strongly resemble *Lepiopomus pallidus* (*incisor*) in outward characters, and lack the brilliant coloration of *Eupomotis aureus*. The name *Xystroplites* is from ξυστρον, an instrument for scraping (gill-raker), and ὁπλίτης, armed, in allusion to the armature of the gill-rakers.

16. XYSTROPLITES GILLII, *sp. nov.*

Head 2½ in length; depth 2; eye about equal to flap, 4½ in head. Body elongate, very deep in the middle, abruptly narrowed each way. Greatest depth at the beginning of dorsal; a rapid slope from this point to the base of elongate caudal peduncle; a steep curve from dorsal to occiput, where an abrupt angle is formed with the projecting snout. Top of head sloping at an angle of about 45°.

Mouth wide, lower jaw a trifle longest; maxillary reaching just past the front of the pupil. Flap moderate, broad, with a very wide pale edge below and behind. Dorsal spines moderate, as long as from snout to middle of orbit; pectorals medium, barely reaching anal. Dorsal X, 10. Anal III, 9. Scales large, 6–42–13; 5 rows on the cheek.

Coloration obliterated; apparently uniform olive; traces of dusky mottlings on last rays of dorsal and anal.

Type, No. 5995, United States National Museum, from Garden Key, Florida.

This species may be known from its congener *X. heros* by the peculiar form, and from the species of *Lepiopomus* by its dentition.

17. LEPIOPOMUS ISCHYRUS, *Jordan & Nelson, sp. nov.*

Ichthelis aquilensis, NELSON, Bull. Ills. Mus. Nat. Hist. i, 1876, 37 (not *Pomotis aquilensis* GRD.).

Numerous young specimens purporting to be types of Baird and Girard's *P. aquilensis* are in the National Museum. Two species seem to be represented among them, the one a *Xenotis*, the other a *Lepiopomus*. Neither of them is identical with *I. aquilensis* Nelson, and as the latter species seems not to have been hitherto named, the above appellation is proposed for it.

18. LEPIOPOMUS APIATUS, *Cope.*

Lepomis apiatus, COPE, Proc. Am. Philos. Soc. 1877. (In press.)

This is a large species related to *L. macrochirus* Raf., and more closely to *L. elongatus* (Holbr.), but stouter built than either, and with marked peculiarities of coloration.

Body deep, compressed, the form somewhat as in *Eupomotis aureus*. Profile rising rapidly from the snout; the nape swollen, forming an angle above the eye; caudal peduncle deep, not especially elongated. Mouth moderate; maxillary reaching to just past anterior margin of the eye, the lower jaw projecting somewhat when the mouth is closed. A small patch of teeth on the anterior edge of the palatines (sometimes obsolete); eye large; opercular flap short and deep, considerably shorter than the eye.

Dorsal spines high, those in the middle highest, so that a slight notch is made at the beginning of the soft rays; the soft parts of the vertical fins are largely scaly. Pectoral fins moderate, barely reaching anal. Anal spines strong, the soft rays high. Longest dorsal spine nearly equal to the distance from the snout to the posterior edge of the orbit.

Head 3 in length, the depth $1\frac{7}{8}$; eye 4 in head, larger than the opercular flap, which is short and deep.

Gill-rakers rather long, stiff, pretty strongly dentate.

Fin-rays:—D. X, 11. A. III, 10.

Scales 6–40–13, those on the cheek large, in about seven rows.

Coloration somewhat altered by the alcohol. There are no spots on the fins, and there are no traces of blue lines on the cheeks. The most marked feature of coloration is the presence on various parts of the body of little dark brown or black spots, chiefly at the base of the

scales, smaller than pins' heads, about the size of the nasal openings, and resembling fly-specks.

On the lower part of the sides of the body, these spots are most distinct, and form irregular lines along the rows of scales. They are present also on the opercular region, and are more or less appreciable on most parts of the body. On some specimens, these spots are distinct over the whole body, being enlarged on the back.

The black opercular spot is very small for the genus, no larger than in the species of *Apomotis*. Besides the black spots, there are also faint pale spots at the base of some of the scales of the sides. These were perhaps conspicuous in life.

The fins generally are rather dark, unspotted; the ventral fins are black.

The length of the specimens described is from 4 to 4½ inches.

Habitat.—St. John's River, Florida. Many specimens in the United States National Museum.

This species was indicated in MSS. some years ago by Prof. Gill, and specimens have been distributed by the Smithsonian Institution under the name *L. stercorarius* Gill. As Prof. Cope's paper will probably appear in advance of this, I have adopted his specific name, instead of publishing it as a new species.

19. LEPIOPOMUS MINIATUS, *sp. nov.*

General form of *Xenotis inscriptus*. Oblong and somewhat regularly elliptical. Head 2¾ in length; depth 2¼; eye large, 3½ in head; opercular flap rather short and broad, entirely black; mouth rather large; scales of cheek large, in four series; scales large, 4–40–11; palatine teeth present; gill-rakers short for *Lepiopomus*, but stiff and rough. Dorsal spines rather long, as long as from snout just past middle of eye; pectorals long, reaching anal. Dorsal X, 10. Anal III, 9.

Color in spirits dark, rows of bright red or scarlet spots running lengthwise of the body; one spot on each scale, and two blackish markings on each side of the red; dorsal fin dusky behind, but unspotted; iris red. Length 4 inches.

Type, No. 16918, United States National Museum. Numerous specimens from Tangipahoa River, Louisiana. This species is perhaps most nearly related to *Lepiopomus auritus*.

20. APOMOTIS PHENAX, *Cope & Jordan, sp. nov.*

Chænobryttus phenax, COPE, MSS.

Form and appearance of *Lepiopomus pallidus*. Head 2½ in length;

depth $2\frac{1}{5}$; eye moderate, as long as snout, rather smaller than opercular flap, about $4\frac{1}{2}$ in head. Mouth moderate, the lower jaw slightly longest, the maxillary reaching middle of eye, with a strong supplemental bone; snout short, projecting, an angle over eye. Gill-rakers very long; flap larger than in the other species of the genus.

Scales on cheek in 7 rows; on body 6–43–14. Mucous cavities strong.

Dorsal spines short and strong, as long as from snout to middle of eye; soft dorsal high, soft anal higher, both largely scaly; caudal fin emarginate; pectoral fins long, reaching anal. Dorsal X, 10. Anal III, 9.

Color in spirits uniform olive-green, paler lines along the rows of scales; soft fins somewhat mottled, but no black blotch on dorsal or anal.

This species bears much more resemblance to *Lepiopomus* and *Xystroplites* than to its congeners. From *A. cyanellus*, it differs in the greater depth and compression of the body, in the longer spines, longer opercular flap, smaller mouth, and larger scales.

Type, two specimens about six inches long, in the Museum of the Philadelphia Academy of Natural Sciences, collected at Beaseley's Point, New Jersey, by Dr. Leidy.

21. ENNEACANTHUS PINNIGER, *Gill & Jordan, sp. nov.*

A very handsome species, rather larger than any other of this genus, and with larger fins.

Body rather short, deep, compressed, regularly ovate in form; the depth half the length (without caudal); the head one-third. Eye large, $\frac{4}{5}$ in head. Mouth rather small, very oblique, the maxillary reaching just opposite the front of the orbit.

Dorsal spines rather long, the soft rays greatly elevated; in the male fish as long as the head, reaching, when depressed, to the middle of the caudal; in the female fish considerably shorter; anal spines long, not rapidly graduated, the longest soft rays as long as those of the dorsal.

Ventral fins elongate; the filiform tips of the longest rays in the males reaching the first soft rays of the anal, the spines falling short of the anal spines. In the females, the ventral fins are shortened and scarcely reach the anal. Pectoral fins moderate, reaching the soft rays of the anal. Caudal fin elongate, nearly as long as head. Lateral line complete.

The female fish has all of the fins very much less elevated, the

longest rays of the dorsal and anal not reaching to caudal; the scales of the body more exposed, and the coloration duller.

Fin-rays:—D. IX, 10; A. III, 10. Scales 4–33–10.

The color of the male specimens in spirits is as follows:—Body olive, with, in some cases, a very faint suggestion of lateral vertical bars; a large black spot at the angle of the opercles, with pearly-blue markings about its base; an obscure bar below eye.

A number of round, luminous, or pearly-blue spots on the sides of the head, irregular in position but very distinct; other similar spots—white in spirits, doubtless sky-blue in life—on the membranes of the vertical fins, and in scattered irregular rows along the sides of the body, in some specimens on nearly the whole surface, forming imperfect lines along the sides. Each row of spots is accompanied by two faint blackish streaks. These spots are largest and most regular in position along the middle of the sides, but most definite in outline on the belly and fins.

The female is duller in color, the flap plain black, with some pale edging, and the body with larger spots, more regular in position but not so well defined. The spots on the fins are also larger and paler.

Length of largest specimens examined 3½ inches.

Habitat.—The types were collected at Kinston, N. C., by Mr. J. W. Milner. Upward of thirty specimens were preserved.

This species seems to be the largest and handsomest of the species of *Enneacanthus*. Its relationships are most close with the next species; but it is probably the most strongly marked of the genus. The sexual distinctions, evident in all the species, are here carried to the extreme.

22. ENNEACANTHUS MARGAROTIS, *Gill & Jordan, nom. sp. nov.*

?*Enneacanthus guttatus*, COPE (1869), Journ. Acad. Nat. Sci. Phila.—(not *Pomotis guttatus* MORRIS (1859), Proc. Acad. Nat. Sci. Phila. 9, which is *E. obesus*).

Enneacanthus obesus, JORDAN (1876), Man. Vert. 232 (excl. expression "barred", copied from Prof. Baird; specimens from Trenton, N. J., supposed to be the male of *obesus*) (not *Pomotis obesus* Grd.).

?*Enneacanthus gloriosus*, UHLER & LUGGER (1876), Fishes of Maryland—(not description, which seems to be copied from Holbrook) (not *Bryttus gloriosus* Holbr.).

No description of this common little species seems ever to have been published. Dr. Morris's notice of his *Pomotis guttatus* is very superficial, and apparently refers to *E. obesus;* the only tangible feature mentioned being the presence of black bars along the sides, which this species does not have.

The following description is taken from a large number of individuals sent by Dr. C. C. Abbott to the Smithsonian Institution from Trenton, N. J., and from others collected by Prof. Baird at Beaseley's Point, N. J.:—

Body rather short and deep, but more elongate than in any of the others; the head 2¾ in length, the depth 2¼; the eye large, longer than snout, 3¼ in head; mouth moderate, very oblique, the maxillary reaching to just past the front of the orbit.

Dorsal spines medium; the soft rays in the males somewhat elevated, reaching when depressed just to the base of the caudal; the longest soft ray as long as from the snout to the preopercular margin. In the females, the rays are shortened, but the sexual differences are much less marked than in *E. pinniger*. Anal spines long, rather rapidily graduated, the longest soft rays as long as those of the dorsal.

Ventral fins as in *E. pinniger*, the longest rays in the males filamentous and reaching the soft rays of anal; in the females shorter. Pectoral fins rather long, reaching middle of anal. Lateral line complete. Fin-rays:—D. IX, 10; A. III, 9. Scales 3–30–9.

General coloration similar to that of *E. pinniger*. Body dark olive; very young specimens with faint traces of vertical bars; a moderate-sized opercular spot, smaller than in *E. obesus*, bordered above and below with luminous blue. Near the anterior edge of the "ear-flap" is a crescent-shaped pearly-blue spot, which, though small, is very conspicuous. Traces of a similar mark may be observed on *E. obesus*. Sides of head, whole body, and vertical fins with round bright blue spots arranged in regular rows; these spots most distinct on the cheeks and opercles and on the lower parts of the sides.

This species resembles the preceding; but the males may be distinguished at once by the much less development of the fins and by the smaller size. The females of the two species bear more resemblance to each other, but differ in a similar way, though to a less degree.

Length of specimens examined about 2¾ inches.

Many specimens in the United States National Museum from the Potomac River, Delaware River and from localities in New Jersey.

The real affinities of *E. margarotis* are probably rather with *E. obesus*, and especially *E. gloriosus*, than with *E. pinniger*.

Bryttus fasciatus Holbrook seems to be identical with *E. obesus*.

I have seen no specimens of *E. gloriosus*, and know it only by Holbrook's description and figure.

The several species have been contrasted in the following table prepared by Dr. Gill and myself:—

*. Dorsal and anal moderately developed in the male as well as female (extending, when declined backward, little if any beyond the base of the caudal); scales on cheek and opercles not crowded, and forming more or less distinct vertical series:

†. Body marked with about eight well-defined dark cross-bars; opercular angle with a pretty large black spot, half or more the size of the eye; spots on body and fins purplish, red, or golden; scales large, little crowded; caudal fin moderately elongate, as long as from snout to about the middle of the opercle; lateral line usually incomplete behind ..... OBESUS.

††. Body without definite cross-bars or bands; opercular spot smaller, but little larger than pupil; caudal fin short, about as long as from snout to the posterior margin of the preopercle:

‡. Spots on body and fins pinkish or golden; dorso-ocular profile moderately convex; interorbital space quite depressed, the protruding snout forming an angle above the eye; body rather short and deep, the depth about half-length; a small black spot at root of caudal ..... GLORIOSUS.

‡‡. Spots on body and fins bright blue; dorso-ocular profile little convex, without decided concavity above orbits; body comparatively elongate, the depth less than half-length; no black caudal spot ..... MARGARITIS.

**. Dorsal and anal fins much enlarged in the males (extending when declined backward as far as the middle of the caudal fin), but not in the female; scales on cheeks and opercles crowded together, forming oblique series; caudal fin very long, in the males as long as from the snout to the black opercular spot; in the females somewhat shorter; anal spines less rapidly graduated; body and fins with round pale spots, some or all of which are bright blue; lateral line complete. PINNIGER.

23. CENTRARCHUS.

Two species, at least, of the genus *Centrarchus* inhabit the waters of the Southern States, which seem to have been named by Lacépède, respectively, *Labrus macropterus* and *Labrus irideus*. *Labrus sparoides* Lacépède is also a *Centrarchus*, either identical with *L. macropterus*, or else it is a species not yet known. It is said to have ten dorsal and ten anal spines. *Centrarchus sparoides* C. & V. is apparently *C. macropterus*.

Centrarchus macropterus is a more elongate species than the common *Centrarchus irideus*. Its mouth is larger, the eye is larger, the fins are much larger, and with longer and more numerous spines. The anal fin in particular is advanced forward, so that the long spine of the ventral fin laps over on the anal as in *Copelandia*.

The most striking differences are shown in the following comparative table of characters:—

	C. macropterus, (Lac.) Jor., Ocmulgee River, Ga.	C. irideus, (Lac.) C. & V., Coosa River, Ala., Neuse River, N. C.
Dorsal rays (usually)	XII, 12	XI, 12.
Anal rays (usually)	VIII, 14	VII, 14.
Head in length	3	$3\frac{1}{6}$.
Depth in length	$2\frac{1}{8}$	2.
Lateral line	5–43–12	5–44–14.
Ventral spine in head	$1\frac{2}{3}$	$2\frac{1}{4}$.
Ventral spine reaching	4th anal spine	Not to vent.
Longest dorsal spine in head	$1\frac{1}{2}$	$1\frac{2}{3}$.
Longest soft dorsal ray in head	$1\frac{1}{3}$	$1\frac{2}{3}$.
Longest soft anal ray in head	$1\frac{1}{6}$	$1\frac{1}{2}$.
Mandible	More than half head	Less than half head.

The coloration in the two species appears to be essentially the same.

GENERA OF CENTRARCHIDÆ.

Prof. Gill now recognizes sixteen genera of *Centrarchidæ*, for which he suggests the following sequence, beginning with the most generalized type, *Micropterus*.

Subfamily MICROPTERINÆ, *Gill.*

1. *Micropterus*, Lacépède.

Subfamily LEPIOPOMINÆ, *Gill.*

§ 1.

2. *Chænobryttus*, Gill.
3. *Ambloplites*, Raf.
4. *Archoplites*, Gill.
5. *Acantharchus*, Gill.

§ 2.

6. *Apomotis*, Raf.
7. *Lepiopomus*, Raf.
8. *Xenotis*, Jordan.
9. *Xystroplites*, Jordan.
10. *Eupomotis*, Gill & Jordan.

§ 3.

11. *Mesogonistius*, Gill.

§ 4.

12. *Enneacanthus*, Gill.
13. *Hemioplites*, Cope.
14. *Copelandia*, Jordan.

Subfamily CENTRARCHINÆ, *Gill.*

15. *Centrarchus*, Cuv. & Val. 16. *Pomoxys*, Raf.

The first section of the subfamily of *Lepiopominæ* is distinguished by the development of an oval patch of teeth on each entopterygoid bone, as well as a continuation on each pterygoid bone of a band of teeth from the palatine bone, a character not hitherto noticed, to which Prof. Gill has called my attention. The setiform gill-rakers, reminding us of the Cichlid genus *Chætobranchus*, form an important distinctive character of *Centrarchinæ*.

ANALYSIS OF THE GENERA OF CENTRARCHIDÆ.

I include here, for the sake of comparison, the aberrant genus *Elassoma*, whose precise affinities are as yet undetermined:—

A. Lateral line well developed; vomerine teeth present; branchiostegals, 6; fins largely developed, with normally more than five dorsal spines (true *Centrarchidæ*):

*. Dorsal fin much more developed than anal fin (the base of the former 1½ to 3 times that of the latter), the soft parts of the two fins about equal, of 8 to 14 rays, and ending at the same vertical behind:

†. Body elongate, not greatly compressed; spines little developed, those of the anal fin, three in number, small and weak; those of the dorsal ten, the eighth and ninth quite short, so that there is a deep notch between the spinous and soft parts of the dorsal, almost breaking the continuity of the fin; caudal emarginate; operculum emarginate behind, ending in two flat points; mouth very large, the lower jaw longest; palatine teeth well developed; tongue and pterygoids toothless; gill-rakers long and stout, armed with teeth; supplemental maxillary bone well developed (*Micropterinæ*) ..... MICROPTERUS, 1.

††. Body comparatively short and deep, compressed; anal spines well developed; dorsal with strong spines, which are continuous with the soft rays, or at least not deeply notched (*Lepiopominæ*):

a. Tongue and pterygoid bones conspicuously armed with teeth: mouth large, lower jaw longest; maxillary bone broad and flat, with a strong supplemental ossicle behind it; palatine teeth well developed; gill-rakers long and strong, provided with coarse teeth; form stout and heavy:

b. Operculum emarginate behind; anal spines 5 to 7:

c. Caudal fin emarginate; scales ctenoid:

d. Tongue with two patches of teeth; anal spines normally 7; dorsal 12; gill-rakers longer, and somewhat more numerous than in the next, ARCHOPLITES, 2.

dd. Tongue with a single median patch of teeth; anal spines normally 6; dorsal 10 or 11 ..... AMBLOPLITES, 3.

cc. Caudal fin rounded behind; scales cycloid; anal spines normally 5, ACANTHARCHUS, 4.

bb. Operculum ending behind in a convex "flap", black in color; anal spines 3; dorsal 10; caudal emarginate ..... CHÆNOBRYTTUS, 5.

aa. Tongue and pterygoid bones toothless; mouth moderate or small:

d. Operculum ending behind in an entire convex process or flap, which is always more or less black; dorsal fin not notched; dorsal spines normally 10; anal spines 3, the soft rays in each about 10 in number; caudal fin emarginate:

e. Maxillary with a supplemental bone; gill-rakers long, stout, dentate; mouth rather large, the lower jaw protruding; palatine teeth present; spines low; flap small ..... APOMOTIS, 6.

ee. Maxillary without supplemental bone; mouth rather small, with subequal jaws:

f. Lower pharyngeal bones comparatively narrow, with the teeth all conic and sharp, the outer short and small, the inner long and pointed:

g. Gill-rakers of anterior branchial arch more or less elongate, ossified, beset with small teeth (gill-rakers long and slender, beset on one side with minute teeth, no palatine teeth, subgenus *Helioperca*;—or comparatively short and thick, with larger teeth, palatine teeth usually present, subgenus *Lepiopomus*) ..... LEPIOPOMUS, 7.

gg. Gill-rakers undifferentiated, all short, thickish, weak, unossified, provided with but few weak teeth; no palatine teeth; opercular flap always large, often greatly developed; coloration brilliant; spines low ..... XENOTIS, 8.

ff. Lower pharyngeal bones with the teeth or most of them rounded or truncate above, *i. e.*, teeth paved, palatine teeth little developed, or more usually wanting:

h. Lower pharyngeals narrow, formed as in *Lepiopomus*, the teeth rounded, not truncate above; gill-rakers rather long and slender; spines rather high ..... XYSTROPLITES, 9.

hh. Lower pharyngeals broad, concave, with large truncate teeth close together; gill-rakers short and thick, more or less strongly dentate; spines high ..... EUPOMOTIS, 10.

dd. Operculum emarginate behind, ending in two flat points, with a dermal border; caudal fin rounded behind; gill-rakers in small number, long and strong, dentate; species of small size and brilliant coloration:

h. Dorsal fin angulated, the middle spines longer than some of the posterior ones; supplemental maxillary wanting (? or rudimentary); anal spines 3; dorsal 10 ..... MESOGONISTIUS, 11.

hh. Dorsal fin continuous; supplemental maxillary bone well developed:

i. Dorsal spines 9; anal 3 ..... ENNEACANTHUS, 12.

ii. Dorsal spines 8; anal 4 ..... HEMIOPLITES, 13.

iii. Dorsal spines 10; anal 4; anal fin with an elongate basis, its anterior rays being advanced ..... COPELANDIA, 14.

** Dorsal and anal fins about equal in extent, the soft portions of the latter longest and most posterior, the two fins being obliquely opposed; lower jaw longest; supplemental maxillary bone present; palatine teeth present; operculum emarginate behind; gill-rakers setiform, very long, finely dentate, in large number (20 to 30 of the large ones on anterior branchial arch); fins large, the soft rays of the dorsal and anal each with 14 to 18 rays; caudal fin emarginate; scales not strongly ctenoid (*Centrarchinæ*):

j. Spinous dorsal longer than soft part, the spines about 12 in number, not rapidly graduated; anal spines normally 8; body deep; mouth moderate. CENTRARCHUS, 15

jj. Spinous dorsal shorter than soft part, the spines 5 to 8 in number, rapidly graduated; anal spines normally 6; body compressed and rather elongate; mouth large ..... POMOXYS, 16.

AA. No lateral line; no vomerine teeth apparent; fins little developed, the dorsal with 5 spines, the anal with 3; branchiostegals apparently 5; scales cycloid; upper jaw unusually protractile; jaws with strong teeth; size small (*Elassominæ*):

k. Mouth small, oblique, the lower jaw the longer; jaws with apparently one row of stout conical teeth; branchiostegal membranes broadly connected across the pectoral region; body rather elongate, compressed; caudal fin rounded; cheeks and opercles scaly ..... ELASSOMA, 17.

CATALOGUE OF SPECIES OF CENTRARCHIDÆ.

I give below a catalogue of the species of *Centrarchidæ*, which appear to be valid, with their geographical distribution. Those of which I have not been able to examine specimens are indicated by a star (*). Several species, as *Lepomis ophthalmicus* Cope, *Bryttus humilis* Grd., are known only from specimens too immature for me at least to come to any certain conclusion as to their true relations.

The type-species of each genus is placed first; *d. s.* indicates doubtful species; *d. g.*, doubt as to whether placed in the proper genus.

MICROPTERUS, *Lacépède.*

1. Micropterus salmoides, (Lac.) Gill.—New England and Great Lake Region to Alabama.
2. Micropterus pallidus, (Raf.) Gill & Jordan.—Great Lake Region and Red River of the North to Virginia, Florida, and Mexico.

CHÆNOBRYTTUS, *Gill.*

3. Chænobryttus gulosus, (C. & V.) Gill.—Upper Great Lakes, Mississippi Valley, and Southwest.
4. Chænobryttus viridis, (C. & V.) Jordan.—Virginia to Florida, east of the Alleghanies.

AMBLOPLITES, *Rafinesque.*

5. Ambloplites rupestris, (Raf.) Gill.—Lake Champlain to the Saskatchawan and south to Florida and Texas. (Includes two or three geographical varieties or nascent species.)
6. Ambloplites cavifrons, Cope.—Virginia to North Carolina.

ARCHOPLITES, *Gill.*

7. Archoplites interruptus, (Grd.) Gill.—Streams of the Pacific Slope.

ACANTHARCHUS, *Gill.*

8. Acantharchus pomotis, (Baird) Gill.—New York to South Carolina, coastwise.

APOMOTIS, *Rafinesque.*

9. Apomotis cyanellus, Raf.—Entire Mississippi Valley and streams of Texas.
10. Apomotis *albulus, (Grd.) Jor., *d. g.*—Texas, &c.
11. Apomotis signifer, (Grd.) Jor., *d. s.*—Texas, &c.
12. Apomotis phenax, Cope & Jordan.—New Jersey.

LEPIOPOMUS, *Rafinesque.*

13. Lepiopomus auritus, (L.) Raf.—Maine to Florida—exclusively east of the mountains.
14. Lepiopomus apiatus, Cope.—Florida.
15. Lepiopomus miniatus, Jordan.—Louisiana.
16. Lepiopomus elongatus, (Holbr.) Gill & Jor.—Florida.
17. Lepiopomus *bombifrons, (Ag.) Jor., *d. g.*—Tennessee River.
18. Lepiopomus obscurus, (Ag.) Jor.—Georgia, Alabama, Tennessee.
19. Lepiopomus ischyrus, Jor. & Nelson.—Illinois.
20. Lepiopomus pallidus, (Mit.) Gill & Jor.—New Jersey to Great Lake Region, Mississippi Valley south to Florida and Texas.
21. Lepiopomus *mystacalis, Cope.—Florida.
22. Lepiopomus humilis, (Grd.) Cope.—Texas.
23. Lepiopomus macrochirus, Raf.—Ohio Valley to Illinois.
24. Lepiopomus anagallinus, Cope.—Kentucky to Kansas.
25. Lepiopomus oculatus, Cope.—Upper Mississippi Valley.

XYSTROPLITES, *Jordan.*

26. Xystroplites gillii, Jordan.—Florida.
27. Xystroplites heros, (B. & G.) Jord.—Texas.
28. Xystroplites notatus, (Ag.) Jord.—Tennessee River.

EUPOMOTIS, *Gill & Jordan.*

29. Eupomotis aureus, (Walbaum) Gill & Jordan.—Upper Mississippi Valley, Great Lake Region to New England, and south to Florida east of the Alleghanies. Not found in the Mississippi Valley south of Iowa.
30. Eupomotis speciosus, (Holbr.) Gill.—Florida.
31. Eupomotis pallidus, (Ag.) Gill & Jordan.—Lower Mississippi Valley, Illinois, and south.

XENOTIS, *Jordan.*

32. Xenotis fallax, (B. & G.) Jordan.—Texas.
33. Xenotis breviceps, (B. & G.) Jordan.—Louisiana to Texas.
34. Xenotis popii, (Grd.) Jord., *d. s.*—Texas.
35. Xenotis megalotis, (Raf.) Jord.—Ohio Valley and Upper Mississippi Valley.
36. Xenotis sanguinolentus, (Ag.) Jord.—South Carolina to Tennessee and Louisiana.
37. Xenotis lythrochloris, Jordan.—Ohio Valley.
38. Xenotis solis, (Val.) Gill & Jor.—Louisiana.
39. Xenotis aureolus, Jordan.—Ohio Valley.
40. Xenotis aquilensis, (B. & G.) Jor., *d. g.*—Texas.
41. Xenotis *marginatus, (Holbr.) Jor., *d. g.*—Florida.
42. Xenotis peltastes, (Cope) Jor.—Michigan to Illinois.
43. Xenotis inscriptus, (Ag.) Jor.—Ohio to Missouri and south.
44. Xenotis ophthalmicus, (Cope) Jor., *d. s.*, *d. g.*—Roanoke River.

MESOGONISTIUS, *Gill.*

45. Mesogonistius chætodon, (Baird) Gill.—New Jersey to Maryland.

ENNEACANTHUS, *Gill.*

46. Enneacanthus obesus, (Grd.) Gill.—Massachusetts to North Carolina.
47. Enneacanthus margarotis, Gill & Jordan.—New Jersey to Vir-

POMOXYS, *Rafinesque.*

§ *Pomoxys.*

55. Pomoxys annularis, Raf.—Entire Mississippi Valley south of Wisconsin and Ohio.

§ *Hyperistius.*

56. Pomoxys nigromaculatus, (Le S.) Girard.—Mississippi Valley, Great Lake Region, and streams of the Atlantic States from New Jersey to Florida.

LIST OF NOMINAL SPECIES OF CENTRARCHIDÆ, WITH IDENTIFICATIONS.

I give a list, in chronological order, of the species of *Centrarchidæ* hitherto described, so far as known to me, with my identification of them. Those species of which I have examined the original type are designated by a dagger (†).

Nominal species.	Date.	Identification.
Labrus auritus, Linné	1758	Lepiopomus auritus.
Sparus aureus, Walbaum	1792	Eupomotis aureus.
Labrus macropterus, Lacépède	1802	Centrarchus macropterus.
Labrus sparoides, Lac.	1802	Centrarchus macropterus (†).
Labrus salmoides, Lac	1802	Micropterus salmoides.
Labrus irideus, Lac	1802	Centrarchus irideus.
Micropterus dolomieu, Lac	1802	Micropterus salmoides.
Morone maculata, Mit.	1814	Eupomotis aureus.
Sparus mocasinus, Raf.	1814	Eupomotis aureus.
Labrus palladus, Mit	1814	Lepiopomus pallidus.
Bodianus achigan, Raf	1817	Micropterus salmoides.
Bodianus rupestris, Raf.	1817	Ambloplites rupestris.
Sparus erythrops, Raf.	1818	(Erroneous.)
Labrus appendix, Mit	1818	Lepiopomus pallidus.
Pomoxis annularis, Raf.	1818	Pomoxys annularis.
Calliurus punctulatus, Raf.	1819	Micropterus salmoides.
Lepomis cyanellus, Raf.	1819	Apomotis cyanellus.
Lepomis macrochirus, Raf.	1819	Lepiopomus macrochirus.
Icthelis melanops, Raf.	1820	Apomotis cyanellus.
Icthelis erythrops, Raf.	1820	Ambloplites rupestris.
Icthelis aurita, Raf. (not of 1819)	1820	Xenotis lythrochloris.
Icthelis megalotis, Raf.	1820	Xenotis megalotis.
Lepomis pallida, Raf.	1820	Micropterus pallidus.
Lepomis trifasciata, Raf.	1820	Micropterus salmoides.
Lepomis flexuolaris, Raf.	1820	Micropterus salmoides.
Lepomis salmonea, Raf.	1820	Micropterus salmoides.

Nominal species.	Date.	Identification.
Lepomis notata, Raf	1820	Micropterus salmoides.
Lepomis ictheloides, Raf	1820	Ambloplites rupestris.
Etheostoma calliura, Raf	1820	Micropterus salmoides.
Cichla ænea, Le Sueur	1822	Ambloplites rupestris.
Cichla fasciata, Le S	1822	Micropterus salmoides.
Cichla ohioensis, Le S	1822	Micropterus salmoides.
Cichla floridana, Le S	1822	Micropterus pallidus.
Cichla minima, Le S	1822	Micropterus salmoides.
Huro nigricans, C. & V	1828	Micropterus pallidus.
Centrarchus pentacanthus, C. & V	1829	Ambloplites rupestris.
Cantharus nigromaculatus, Le Sueur	1829	Pomoxys nigromaculatus.
Pomotis vulgaris, C. & V	1829	Eupomotis aureus.
Pomotis gulosus, C. & V	1829	Chænobryttus gulosus.
Centrarchus hexacanthus, C. & V	1831	Pomoxys nigromaculatus.
Centrarchus viridis, C. & V	1831	Chænobryttus viridis.
Bryttus punctatus, C.& V	1831	Apomotis cyanellus.
Bryttus reticulatus, C. & V	1831	Chænobryttus viridis.
Bryttus unicolor, C. & V	1831	(?)
Pomotis ravenelii, C. & V	1831	Eupomotis aureus.
Pomotis holbrookii, C. & V	1831	Eupomotis aureus.
Pomotis incisor, C. & V	1831	Lepiopomus pallidus.
Pomotis gibbosus, C. & V	1831	Lepiopomus pallidus.
Pomotis solis, C. & V	1831	Xenotis solis.
Pomotis catesbœi, C. & V	1831	Eupomotis aureus.
Cichla storeria, Kirt	1838	Pomoxys annularis.
Pomotis nitida, Kirt	1841	Xenotis megalotis.
Centrarchus obscurus, De Kay	1842	Micropterus salmoides.
Pomotis rubricauda, Storer	1842	Lepiopomus auritus.
Pomotis aquilensis, B. & G.†	1853	Xenotis (?) aquilensis.
Pomotis breviceps, B. & G.†	1853	Xenotis breviceps.
Pomotis longulus, B. & G.†	1853	Apomotis cyanellus.
Grystes nobilis, Ag	1854	Micropterus pallidus.
Pomotis sanguinolentus, Ag	1854	Xenotis sanguinolentus.
Pomotis inscriptus, Ag	1854	Xenotis inscriptus.
Pomotis notatus, Ag	1854	Xystroplites (?) notatus.
Pomotis obscurus, Ag	1854	Lepiopomus obscurus.
Pomotis bombifrons, Ag	1854	Lepiopomus (?) bombifrons.
Pomotis pallidus, Ag	1854	Eupomotis pallidus.
Pomotis speciosus, B. & G.†	1854	Lepiopomus pallidus (var.?).
Pomotis fallax, B. & G.†	1854	Xenotis fallax.
Pomotis convexifrons, B. & G.†	1854	Xenotis fallax.
Pomotis nefastus, B. & G	1854	Xenotis (?) aquilensis.
Pomotis heros, B. & G.†	1854	Xystroplites heros.

Nominal species.	Date.	Identification.
Grystes nuecensis, B. & G †	1854	Micropterus pallidus.
Centrarchus interruptus, Grd. †	1854	Archoplites interruptus.
Centrarchus maculosus, Ayres	1854	Archoplites interruptus.
Pomotis obesus, Grd. †	1854	Enneacanthus obesus.
Pomotis elongatus, Holbr	1855	Lepiopomus elongatus.
Pomotis speciosus, Holbr	1855	Eupomotis speciosus.
Pomotis marginatus, Holbr	1855	Xenotis marginatus.
Bryttus fasciatus, Holbr	1855	Enneacanthus obesus.
Bryttus gloriosus, Holbr	1855	Enneacanthus gloriosus.
Calliurus floridensis, Holbr	1855	Chænobryttus viridis.
Pomotis chætodon, Baird †	1855	Mesogonistius chætodon.
Centrarchus pomotis, Baird	1855	Acantharchus pomotis.
Grystes megastoma, Garlick	1857	Micropterus pallidus.
Pomoxis nitidus, Grd. †	1857	Pomoxys annularis.
Calliurus melanops, Grd. †	1857	Chænobryttus gulosus.
Calliurus diaphanus, Grd	1857	Apomotis cyanellus.
Calliurus formosus, Grd. †	1857	Apomotis cyanellus.
Calliurus microps, Grd. †	1857	Apomotis cyanellus.
Calliurus murinus, Grd. †	1857	Apomotis cyanellus.
Bryttus albulus, Grd	1857	Apomotis (?) albulus.
Bryttus signifer, Grd. †	1857	Apomotis signifer.
Bryttus humilis, Grd. †	1857	Lepiopomus humilis.
Pomotis luna, Grd	1857	Lepiopomus pallidus.
Pomotis popei, Grd. †	1858	Xenotis popii.
Pomotis guttatus, Morris	1859	Enneacanthus obesus.
Pomotis microlophus, Gthr	1859	Eupomotis speciosus.
Hyperistius carolinensis, Gill	1864	Pomoxys nigromaculatus.
Pomoxys brevicauda, Gill †	1865	Pomoxys annularis.
Pomoxys intermedius, Gill	1865	Pomoxys annularis.
Pomoxys protacanthus, Gill	1865	Pomoxys annularis.
Bryttus oculatus, Cope †	1865	Lepiopomus oculatus.
Lepomis longispinis, Cope †	1865	Lepiopomus pallidus (var. ?).
Bryttus mineopas, Cope †	1865	Apomotis cyanellus.
Ambloplites cavifrons, Cope †	1869	Ambloplites cavifrons.
Hemioplites simulans, Cope †	1869	Hemioplites simulans.
Lepomis anagallinus, Cope †	1869	Lepiopomus anagallinus.
Lepomis ardesiacus, Cope †	1869	Lepiopomus pallidus (juv.).
Lepomis ophthalmicus, Cope †	1869	Xenotis sp. ? (juv.).
Lepomis gillii, Cope †	1869	Chænobryttus viridis.
Lepomis charybdis, Cope	1869	Chænobryttus gulosus.
Lepomis nephelus, Cope †	1869	Lepiopomus macrochirus.
Lepomis purpurascens, Cope †	1870	Lepiopomus pallidus (var. ?).
Lepomis peltastes, Cope *	1870	Xenotis peltastes.

Nominal species.	Date.	Identification.
Dioplites treculii, Le Vaillant & Bocourt.	1874	Micropterus pallidus (?).
Dioplites variabilis, (Le S.) Le V. & Boc...	1874	Micropterus pallidus (?).
Copelandia eriarcha, Jor. †	1876	Copelandia eriarcha.
Xenotis lythrochloris, Jor. †.....	1877	Xenotis lythrochloris.
Xenotis aureolus, Jor. †	1877	Xenotis aureolus.
Xystroplites gillii, Jor. †	1877	Xystroplites gillii.
Lepiopomus ischyrus, Jor. & Nels. †	1877	Lepiopomus ischyrus.
Apomotis phenax, Cope. & Jor. †	1877	Apomotis phenax.
Lepiopomus miniatus, Jor.†	1877	Lepiopomus miniatus.
Enneacanthus pinniger, Gill & Jor. †.....	1877	Enneacanthus pinniger.
Enneacanthus margarotis, Gill & Jor....	1877	Enneacanthus margarotis.
Enneacanthus milnerianus, Cope, MSS....	1877	Enneacanthus milnerianus.
Lepomis apiatus, Cope, MSS.....	1877	Lepiopomus apiatus.
Lepomis mystacalis, Cope, MSS.....	1877	Lepiopomus mystacalis.
Xystroplites longimanus, Cope, MSS.....	1877	Eupomotis speciosus (?).

24. XENOTIS LYTHROCHLORIS.

Ichthelis aurita, RAF., Ichthyologia ohiensis, 1820 (not *Labrus auritus* Linn.; not *Lepomis auritus* Raf., 1819).

Lepomis auritus, COPE, Journ. Acad. Nat. Sci. Phila. 1868 (not *Lepomis auritus* Gill).

Ichthelis sanguinolentus, JORDAN, Man. Vert. 1876 (in part, confounded with *X. megalotis* and *X. sanguinolentus*.)

Xenotis lythrochloris, JORDAN (1877), Bull. U. S. Nat. Mus. ix, —.

This elegant species is fairly described by Rafinesque, and quite accurately by Prof. Cope, but no other writers seem to have distinguished

[redacted]

I supply that of *lythrochloris*, in allusion to the blood-red and pale-green coloration.

Xenotis lythrochloris needs comparison chiefly with *X. megalotis*. The body is elongate proportionally, somewhat as in the species of *Apomotis*, but the profile is quite steep. The back along the base of the dorsal fin is unusually straight, not strongly bowed as in *megalotis*. The colors are different in life; there is more red on the cheeks and fins in *X. lythrochloris*, but the ground-color of the back is a decided olive-green with blue spots. The belly, as in *megalotis*, is orange. The membrane of the soft parts of the vertical fins in *X. lythrochloris* is bright orange-red. The spines are extremely short, the longest about equal to length of snout. The most available distinctive point is in the opercular flap, which is extremely long, longer than in *megalotis* or *sanguinolentus*, and *entirely black, without any trace of pale edging whatever*, except at base. In *megalotis*, the flap is conspicuously edged with paler.

X. megalotis abounds most in ponds and still deep places in the rivers. *X. lythrochloris* runs up the small brooks into places where it and *Apomotis cyanellus* are the only Centrarchine inhabitants, whence it often comes to adorn the urchin's string in company with *Semotilus corporalis*, *Catostomus teres*, *Campostoma anomala*, and other "boys' fish".

25. XENOTIS AUREOLUS, *Jordan.*

? *Pomotis macrochira*, KIRTLAND (1839), Bost. Journ. Nat. Hist. iii, 469.—STORER (1846), Synopsis, 298 (not *Ichthelis macrochira* Raf.=*Lepomis nephelus* Cope).

Ichthelis macrochira, JORDAN (1876), Bull. Buff. Nat. Hist. Soc. 92; Manual Vert. 236 (not of Raf.).

Xenotis aureolus, JORDAN (1877), Bull. ix, U. S. Nat. Mus. —.

Body oblong, rather heavy forward; the forehead usually quite convex, but sometimes the profile straightish or almost concave; depth about $2\frac{1}{5}$ in length; head $2\frac{2}{3}$; eye about as large as flap in adult, 4 in head; mouth moderate; scales on cheeks rather large, in 5 or 6 rows.

Fin-rays as in related species; dorsal spines short, rather longer than in *X. lythrochloris*, but scarcely longer than snout; pectorals moderate; ventrals elongate.

Colors very clear and translucent, the young almost transparent, the adult lustrous, clear pale green above; sides with much spotting of golden orange or brassy, the spots numerous but not well defined, shading into the green; the orange predominating below; the belly clear orange; some blue spotting on sides, a purplish-red lustre on the sides in life, peculiar to this species. This disappears at death.

Soft parts of vertical fins, particularly the anal, with the membrane, clear orange; ventral fins bluish; cheeks with three broad bronze-orange bands, between which are bands of bluish-green; two bronze bands in front of eye; space beneath eye largely blue-green and iridescent.

Opercular flap not long, narrow, varying to rather wide, with a conspicuous purple margin; iris red; pupil black.

Size small. I have seen none over four inches in length.

Habitat—Ohio Valley; rather common in bayous and still places in small creeks. It occurs in company with *Xenotis lythrochloris*, and, like that species, is commonly among the treasures of the small boy as he comes back from the swimming-hole.

This species much resembles the young of *X. megalotis*, the only species with which it need be compared. *X. megalotis* is more positively and brilliantly colored; there is more blue; the spines are lower, and the scales on the cheeks smaller. *X. aureolus* is chiefly of a golden orange, and in life has a translucency of hue unlike the colors of any other species. In spirits, it becomes of a pale yellowish or white. It is probable that Kirtland's description of *Pomotis macrochira* was drawn up from a specimen of this species. It is certain, however, that Kirtland confounded two or three species under the name of *macrochira*, among them probably *Lepiopomus pallidus*. This cannot well be the species called *macrochira* by Rafinesque. I have therefore proposed the new name of *aureolus*, in allusion to its gilded coloration.

26. XENOTIS INSCRIPTUS, (*Agassiz*) *Jor.*

Pomotis inscriptus, AGASSIZ (1854), Amer. Journ. Sci. Arts, 302.
Lepomis inscriptus, COPE (1869), Journ. Acad. Nat. Sci. Phila. —.
Ichthelis inscriptus, JORDAN (1876), Manual Vert. 237.
Xenotis inscriptus, JORDAN (1876), Ann. N. Y. Lyc. Nat. Hist. —.

Body oblong, little elevated, the depth 2½ in length; profile and dorsal outline forming a nearly uniform curve from snout to caudal peduncle; eye large, larger than in *megalotis*; mouth moderate; cheek-scales large.

Pectoral fins short, not reaching anal; dorsal spines low, but high for this genus, more developed than in any of the other species, the longest about as long as from snout to middle of pupil; ventral fins not reaching anal.

A small compact handsome species of a dark color, not at all translucent; color dark olive-green, with blue shades; cheeks with blue

lines; opercular flap pretty long, rather narrow, its lower margin being shorter than the upper, directed more obliquely upward than in the other species, bordered above and below with pinkish, many of the scales of the back and sides marked with a short horizontal black line like a pencil-mark, these usually forming interrupted lines along the rows of scales. These markings are often obsolete. Fins dark olive, only the anal usually with red; no black dorsal spot.

Length of specimens examined about 4 to 5 inches.

Habitat.—Tennessee River (Agassiz, Cope); Etowah River (Jordan); White River, Indiana (Jordan); Mississippi River at Cairo (Jordan).

This species may be known to be a *Xenotis* by the ear-flap and the weak gill-rakers. From the other Ohio species, its longer spines, dark green coloration, and the peculiar upward direction of the opercular flap distinguish it. The black streaks which suggested the name *inscriptus* usually disappear with death.

27. LEPIOPOMUS PALLIDUS, (*Mitchill*) *Gill & Jordan.*

Labrus pallidus, MITCHILL, 1814, = *Labrus appendix*, MITCHILL, 1818, = *Pomotis incisor*, CUV. & VAL., 1831.

We have here restored the oldest and therefore correct specific name to this species. The genus *Helioperca*, recently proposed by me for this species and its immediate relatives, does not seem sufficiently distinct from *Lepiopomus*. I therefore abandon it, for the present, at least.

28. MICROPTERUS PALLIDUS, (*Rafinesque*) *Gill & Jordan.*

Lepomis pallida, RAFINESQUE, 1820, = *Cichla floridana*, LE SUEUR, 1822, = *Huro nigricans*, C. & V., 1828.

Rafinesque's description of his *Lepomis pallida* seems to have been drawn from this species. His specific name should therefore be adopted. This change is especially desirable, as it does away with the objectionable local name *floridanus* for this widely distributed species.

PERCIDÆ.

29. STIZOSTETHIUM, *Rafinesque.*

The American species of this genus have been involved in considerable confusion, and no one seems to know positively whether we have

two, three, four, or five species, or how those species may be distinguished from each other, or, finally, what names any of them should bear. Having lately been enabled to examine a large number of specimens in a fresh state, through the kindness of John C. Klippart, the efficient fish commissioner of the State of Ohio, I have come to certain provisional conclusions, which I have thought it advisable to insert here.

Among the species of *Stizostethium*, there are two well-marked groups, known to our lake fishermen respectively as the "Saugers" and the "Pikes". These differ somewhat in external peculiarities of form and coloration, and strongly in the arrangement of the pyloric cœca.

In the "Pike" group, there are three pyloric cœca, long and large, subequal, and all longer than the stomach. In the "Saugers", the pyloric cœca are much shorter and smaller. There are four larger than the rest, not quite equal, and all shorter than the stomach. Besides the four larger ones, there are one, two, or three small ones. The total number is usually six, but sometimes the small ones are obsolete.

In the extreme generic subdivision which at present obtains, any such decided anatomical peculiarity may be held to indicate generic distinction. I therefore propose to consider the "Saugers" as at least subgenerically distinct from the "Pikes".

The name *Stizostedion* was proposed by Rafinesque for his *Perca salmonea*, the "White Salmon of the Ohio". Rafinesque's description is not altogether satisfactory; but, as a certain fish of this genus is still known as the "White Salmon," at the Falls of the Ohio, it is possible to make an undoubted identification. The *Perca salmonea* is a "Pike", and therefore the name *Stizostedion* (or rather *Stizostethium*, for the name is stated to mean "pungent throat") should be retained for the Pikes.

Since the preceding paragraphs were in type, Prof. Gill and the writer have been enabled to compare the American species of *Stizostethium* with the two inhabiting the waters of Europe, viz, *Stizostethium lucioperca* (L.) G. & J. (*Lucioperca sandra* C. & V.) and *Stizostethium volgense* (Pallas) G. & J. The genus divides at once into four strongly marked sections or subgenera, of which two—that typified by *S. canadense* and that by *S. volgense*—bear little resemblance to each other, and could be readily considered as generically distinct were not the other two sections intermediate. (1) The section typified by *S. volgense* in several respects approaches the genus *Perca:* it may be termed *Mimoperca* (G. & J.). (2) The Sauger group, from the development of the canine teeth, may be appropriately designated as *Cynoperca* (G. & J.).

(3) The American Pike-perch group was called *Stizostethium* by Rafinesque, and (4) the Sandres of Europe were called nearly simultaneously *Lucioperca* by Cuvier and *Sandrus* by Stark. The *Lucioperca marina* Cuv. & Val. (*Perca labrax* Pallas), if correctly described, has apparently no affinity with the genus.

The following analysis of the characters of these groups has been compiled by Prof. Gill and myself after a rigorous comparison of the several forms. It may be stated that we have been unable to ascertain certainly the character of the pyloric cœca in *Mimoperca* and *Lucioperca*, the two specimens of each species in the National Museum being deprived of their intestines:—

*. Dorsal fins well separated, the interspace between them more than the diameter of the eye; the distance from the base of the last spine of the first dorsal and the first of the second equal to the space occupied by the last 4 to 6 spines of the first dorsal; anal fin II, 12, longer than high; second dorsal I, 17, to I, 21; spines of the second dorsal and anal closely attached to the soft rays; last dorsal spine scarcely erectile, more or less firmly bound down by the membrane; canine teeth strong (American species):

†. Soft dorsal comparatively short (its base one-fourth shorter than that of spinous dorsal) and with about 17 short rays; cheeks, opercles, and top of head more or less closely scaled; body depressed, subterete; size small; pyloric cœca forming two groups, the primary one of four, unequal, moderate, much shorter than the stomach; the secondary of few (1–3) rudimentary ones, which are sometimes atrophied ..... CYNOPERCA.

††. Soft dorsal rather long (one-sixth shorter than spinous dorsal), with about 20 soft rays; cheeks and upper surface of head nearly naked; body more compressed; size large; pyloric cœca three, subequal, all long (about as long as stomach), STIZOSTETHIUM.

**. Dorsal fins approximated, connected by low membrane, the interspace much less than the diameter of the eye; the distance between the last spine of the first and the first spine of the second only equalling the base covered by the last four or fewer rays of the spinous dorsal; spines of second dorsal and anal connected with succeeding rays by loose membrane; last dorsal spine erectile; second dorsal usually I, 22 or 23; anal fin at least as high as long; body compressed; size large (European species, the body more or less distinctly transversely barred and the first dorsal with series of roundish black spots):

‡. Soft dorsal considerably (one-fifth) *shorter* than spinous dorsal; anal fin II, 12, as long as high; canine teeth strong; "pyloric cœca 4 to 6" ..... LUCIOPERCA.

††. Soft dorsal somewhat *longer* than spinous dorsal; anal fin short and high; its length two-thirds its height; its rays II, 10; canine teeth weak, not much differentiated; body strongly compressed as in the genus *Perca*; "pyloric cœca three" (*Günther*) ..... MIMOPERCA.

Of American species I know certainly three, the Wall-eyed Pike or Yellow Pike (*Stizostethium vitreum*), the Blue Pike or White Salmon (*Stizostethium salmoneum*), and the Sauger or Gray Pike (*Stizostethium griseum* or *canadense*). The "Sauger" of the Saint Lawrence, *S. canadense*, may be distinct from *S. griseum*, but at present I think it is not;

and, finally, the "Blue Pike" is possibly, but improbably, distinct from the "White Salmon".

Without further discussion, I will give the synonymy and characters of the species now recognized.

30. STIZOSTETHIUM VITREUM (*Mitchill*) *Jordan & Copeland.*

Wall-eyed Pike—Glass Eye—"Dory"—"Salmon"—Pike-perch—Doré—Okow-Horn Fish—Green Pike—Yellow Pike (? female).

Perca vitrea, MITCHILL (1818), Supplement Am. Monthly Mag. ii, 247 (Cayuga Lake).

Stizostedium vitreum, JORDAN & COPELAND (1876), Check List N. Am. Fresh Water Fishes, Bull. Buff. Soc. Nat. Hist. 136.

Stizostethium vitreum, JORDAN (1877), Ann. N. Y. Lyc. Nat. Hist.—JORDAN (1877), in Klippart's Rept. Fish Commr. Ohio.

Lucioperca americana, CUV. & VAL. (1829), ii, 122.—RICHARDSON (1836), Fauna Bor.-Am. iii, 10.—KIRTLAND (1838), Zool. Ohio, 192; Bost. Journ. Nat. Hist. iv 237.—THOMPSON (1842), History Vt. 130.—DE KAY (1842), Zool. N. Y. Fishes, 17.—STORER (1846), Synopsis, 276.—AGASSIZ (1850), Lake Superior, 294.—JARDINE (1852), Nat. Libr. Perches, 107.—GÜNTHER (1859), Cat. Fishes, i, 74—JORDAN (1874), Ind. Geol. Survey, 212; and of writers generally.

Stizostedium americanum, COPE (1865), Proc. Acad. Nat. Sci. Phila. 82, 85.—COPE (1870), Proc. Am. Philos. Soc. 448.—MILNER (1872-3), Rept. U. S. Fish Comm. 425.—JORDAN (1876), Man. Vert. 225.—UHLER & LUGGER (1876), Fishes of Maryland, 110.—NELSON (1876), Bull. Ills. Mus. Nat. Hist. 36.

Body elongate, rather slender and subcylindric, becoming deep with age; the depth in young of 14 inches, $4\frac{1}{2}$ to 5 in length; head long, $3\frac{3}{4}$ in length. Mouth large, the maxillary reaching beyond the pupil to posterior margin of orbit; its length $2\frac{3}{4}$ to 3 in head. Mandible a little more than half length of head; eyes large, less than in *salmoneum*, shorter than snout and than preopercle, $4\frac{1}{2}$ to 5 in head. Jaws equal, or the lower slightly projecting, its sides somewhat included. Cheeks scaly, varying to nearly smooth, usually a few scales at least behind the eye. Opercle with a strong flat spine, which is sometimes bifid or trifid; no smaller ones below it. Dorsal spines high, more than half the length of head, as long as from snout past eye and $\frac{1}{3}$ to $\frac{1}{2}$ past opercle.

General color a heavy olive, varying considerably, finely mottled with brassy, the latter color forming indistinct lines, which run obliquely upward and backward along the rows of scales. Sides of head more or less vermiculated; lower jaw flesh-colored; belly and lower fins pinkish.

Spinous dorsal fin without black spots except a large jet-black blotch, which involves the membrane of the last two or three spines. Second

dorsal and caudal mottled olive and yellowish. Base of pectorals without distinct black spot.

Fin-rays:—Dorsal XII or XIII—1, 20 or 21. Anal II, 12. Lateral line with about 90 scales. Pyloric cæca long and large, subequal, three in number.

Size very large; this species reaches a length of nearly three feet and a weight of twenty or thirty pounds.

Habitat.—Upper Mississippi River, Great Lake Region and streams of the Atlantic slope, south of New England, north to the Fur Countries.

31. STIZOSTETHIUM SALMONEUM, *Rafinesque.*

Blue Pike (Lake Erie)—White Salmon (Ohio River).

Perca salmonea, RAF. (1818), Am. Monthly Mag. v, 354; (1820), Ich. Oh. 21.
Stizostedion salmoneum, RAF. (1820), Ich. Oh. 23.
Stizostedium salmoneum, COPE (1865), Proc. Acad. Nat. Sci. Phila. 82.—JORDAN (1876), Man. Vert. 225.—COPE (1870), Proc. Am. Philos. Soc. 449.—JORDAN & COPELAND (1876), Check List, 136.—NELSON (1876), Bull. Ills. Mus. Nat. Hist. 36.
Stizostethium salmoneum, JORDAN (1877), Ann. N. Y. Lyc. Nat. Hist. —; (1877), in Klippart's Rept. Fish Commrs. Ohio, —.
?? *Perca nigropunctata*, RAF. (1820), Ich. Oh. 23 (very erroneous).
?? *Pomacampsis nigropunctatus*, RAF. (1820), Ich. Oh. 23.

This species is very similar to the preceding in its technical characters, and it may prove to be merely a variety. The body is shorter, thicker, and deeper, with slenderer caudal peduncle, the diameter of which is not much greater than that of the large eye. The mouth is smaller, the maxillary not reaching quite to the posterior margin of the pupil, 3 in head; the eye is larger, its diameter equal to the length of the snout or that of the preopercle; the lower jaw is slightly included.

The dorsal spines are evidently considerably lower than in *S. vitreum*, the longest about equal to the distance from the snout to a point just short of hinder margin of orbit, about $2\frac{1}{3}$ in head.

The coloration is similar to that of *S. vitreum*, but the adult is bluer or greener, with scarcely any of the brassiness characteristic of the latter species. The coloration of the fins is darker, and there are traces of a blackish horizontal band along the dorsal in addition to the large black blotch on the hinder rays. Young specimens (from Ohio River) are more silvery, with traces of faint black bars along the back.

Fin-rays:—Dorsal XIV—1, 20. Anal II, 13. Lateral line with 95 scales. Opercular spine single, as in *S. vitreum*. Cheeks largely naked. Pyloric cœca three, large, longer than stomach, as in the preceding species.

Size much less than that of *S. vitreum*. The largest specimens seen by me were about fourteen inches in length. The accompanying figure represents the stomach and pyloric cœca of one of these.

Habitat.—Lake Erie, Ohio River, and southward to Georgia.

32. STIZOSTETHIUM (CYNOPERCA) CANADENSE, (*C. H. Smith*) *Jordan.*

Sauger—Gray Pike—Sand Pike.

? *Lucioperca canadensis*, C. H. SMITH, MSS. (1834).—GRIFFITH'S Cuvier's Animal Kingdom, x, 275.—RICHARDSON (1836), Fauna Bor.-Am. Fishes, iii, 17.—DE KAY (1842), N. Y. Fauna, Fishes, 19.—STORER (1846), Synopsis, 276.—GÜNTHER (1859), Cat. Fishes, i, 75.—JORDAN (1877), Klippart's Report, 225.

? *Stizostedium canadense*, JORDAN (1876), Man. Vert. 225.—JORDAN & COPELAND (1876), Check List, 136.

Lucioperca grisea, DE KAY (1842), N. Y. Fauna, Fishes, 19.—STORER (1846), Synopsis, 276.—GÜNTHER (1859), Cat. Fishes, i, 76.—JORDAN (1874), Ind. Geol. Surv. 212.

Stizostedium griseum, MILNER (1875), Rept. U. S. Fish Com. 1872-3.—JORDAN (1876), Man. Vert. 225.—NELSON (1876), Bull. Ills. Mus. Nat. Hist. 36.—JORDAN & COPELAND (1876), Check List, 136.

Lucioperca borea, GRD. (1857), Proc. Acad. Nat. Sci. Phila. Nov. (not Okow or Horn Fish of Richardson, which is *S. vitreum*).

Stizostedion boreus, GRD. (1858), Pac. R. R. Survey, x, 31.

Stizostedium boreum, JORDAN & COPELAND (1876), Check List, 136.

I have never seen a specimen of the Sauger with the opercular spines exactly as represented in Smith's figure of his *canadensis*. I find, however, much variation in this respect, and I have seen specimens with 1, 2, 3, and 4 spines; and also specimens with the two sides unlike. Until it is known that there is a second species of Sauger in our waters differing from *griseum* by the constant presence of four opercular spines, it is safest to unite *griseum* and *canadense*.

The types of *Stizostedion boreus* Girard are preserved in the United States National Museum, and seem to be the common "Sauger", *S. canadense*. Part of Dr. Girard's description of this species is borrowed from Richardson, and applies to *S. vitreum*.

Body most elongated, more terete than in *Stizostethium* proper, with the back scarcely compressed, so broad that the lateral line may be seen in a view from above, the back somewhat angulated as it descends to the sides, the depth of the body 4½ to 5 in length.

Head quite pointed, about 3½ in length, the slope of the profile greater than in *Stizostethium*. Eye smaller, 5 to 5½ in head in adult; mouth rather smaller, the lower jaw included; maxillary reaching to opposite posterior margin of eye.

rcle with a sharp flat spine, usually a smaller one below it and an re one above; sometimes two or three smaller ones below, often the position and number of these spines extremely variable. s usually closely scaled, the hinder third or less sometimes naked. n furrow on top of head closely scaled.

oration paler and more translucent, the shades less blended than *Stizostethia;* olive-gray above, sides considerably brassy or pale e, with much black mottling, the black gathered into several defi- ark areas, the most distinct of these being opposite the second ; two others fainter, at each extremity of the spinous dorsal and base of caudal. These blotches are irregular and diffuse, but very cteristic. Young specimens are pale orange, with broad black s.

nous dorsal with two or three rows of round black spots, one of row on the membrane between each pair of spines; no distinct on posterior part of the fin; a large black blotch at base of pec- . Second dorsal with about three rows of irregular dark spots; l yellowish and dusky, almost barred. Fin-rays:—dorsal XII—1, 17, ng to XIII—1, 18; anal II, 12. Lateral line with 92 to 98 scales.

oric cœca 4 to 7; four of them larger than the rest, of different hs, all small and shorter than the stomach. The usual number is ut the two small ones are sometimes one or both absent, sometimes cated. Length of adult 10 to 15 inches.

bitat.—Great Lake Region, and Upper Mississippi Rivers, also in Ohio, where it has been introduced from the lakes, through the s, according to the fishermen.

different form and coloration, particularly the markings of the l fin, distinguish this species at once from the *Stizostethia.* This es has, moreover, always fewer dorsal rays, more scaly cheeks, and erent armature of the operculum.

following is a catalogue of the known species of *Stizostethium,* references to Dr. Günther's Catalogue of the Fishes in the British um, vol. i:—

STIZOSTETHIUM (CYNOPERCA) CANADENSE, (*Smith*) *Jordan.*

Lucioperca canadensis, Günther, i, p. 75.
Lucioperca grisea, Günther, i, p. 76.
Lucioperca (*borea*), Günther, i, p. 501 (*d. s.*).

STIZOSTETHIUM (STIZOSTETHIUM) VITREUM, (*Mitchill*) *Jordan & and.*

Lucioperca americana, Günther, i, p. 74.

3. STIZOSTETHIUM (STIZOSTETHIUM) SALMONEUM, *Rafinesque.*

4. STIZOSTETHIUM (LUCIOPERCA) LUCIOPERCA, (*Linnæus*) *Gill & Jordan.*

Lucioperca sandra, Günther, i, p. 75.

5. STIZOSTETHIUM (MIMOPERCA) VOLGENSE, (*Pallas*) *Gill & Jordan.*

Lucioperca wolgensis, Günther, i, p. 74.

ELASSOMINÆ.

33. ELASSOMA, *Jordan, gen. nov.*

In a collection of fishes lately sent to me by Prof. H. S. Reynolds, taken in the Little Red River, White County, Arkansas, I find two specimens of a curious little fish, representing a type entirely new to me, for which I would propose the above generic name (ἐλασσωμα, a being reduced or diminished).

The characters of the pharyngeal bones cannot well be ascertained on account of the small size of the specimens; I am, therefore, unable at present to definitely refer the genus to its proper family. It possibly, however, belongs to the family of *Cichlidæ*, so numerously represented in the fresh waters of South America, of which but one species, *Heros cyanoguttatus* (B. & G.), has thus far been recorded from the United States.

The following are the generic characters of *Elassoma*, so far as they can be made out from the type-specimens:—

Form and to some extent aspect of *Aphododerus*, but more compressed; fins small; dorsal with five spines; anal with three; ventrals distinct, thoracic, each with one small spine and five soft rays; branchiostegals apparently five; mouth small, oblique, the lower jaw longest; each jaw apparently with a single row of large conical teeth; no vomerine teeth (?); cheeks and opercles scaly; body entirely scaly; no visible lateral line; branchiostegal membrane broadly united across the pectoral region; caudal fin truncate; vent normal.

Typical species *Elassoma zonata*, Jordan.

34. ELASSOMA ZONATA, *Jordan, sp. nov.*

Form rather elongate, compressed, especially behind; the nape rather broad and depressed, forming a straightish profile, the head narrowed forward, short but rather pointed, broadest below. Head 3 in length; depth about 3½. Eye large, greater than snout; 3 in head. Mouth

considerably protractile, small, oblique, the maxillary scarcely reaching pupil.

Fin-rays:—Dorsal V, 7 (6 to 10; the exact number of soft rays I am unable to make out). Anal III, 6 (5 to 8); the spines of the dorsal continuous with the soft rays.

Color olive-green, finely punctulate everywhere; sides with about eleven parallel vertical bands of dark olive, about equal in width, narrower than the eye, the bands about as wide as the pale interspaces.

A roundish black spot, nearly as large as the eye, under the beginning of the spinous dorsal, just above the axis of the body, as in many South American *Cichlidæ*; soft fins faintly barred; cheeks and under parts of head profusely speckled with fine black dots, as in *Aphododerus cookianus*.

Length of each of the three specimens known just one inch. It probably grows to a somewhat larger size, but the fact that it has thus far apparently been overlooked by collectors, leads me to think that its maximum dimensions are quite small.

Habitat.—Little Red River, Arkansas; collector, Henry S. Reynolds; two specimens. Rio Brazos, Texas, a single specimen noticed in a bottle of Sunfishes in the United States National Museum, without other label than that of the locality.

This species seems to bear little relation to any of the genera of *Cichlidæ* described from South America by Dr. Günther or Professor Cope. I therefore propose to consider it as forming a distinct subfamily, and leave the matter of its relationships for future investigation.

APHODODERIDÆ.

35. ASTERNOTREMIA, *Nelson*, MSS., *nom. gen. nov.*

Sternotremia, NELSON, Bull. Ills. Mus. Nat. Hist. 1876.

Some objection has been made to the name *Sternotremia* on the ground that it is anatomically incorrect and misleading, the vent not being in the "*sternon*", as in *Aphododerus*, but entirely behind it. As the name *Sternotremia* was given through a misunderstanding of the meaning of "*sternon*", Mr. Nelson proposes to modify it to *Asternotremia*, which term is anatomically correct, and indicates the chief distinction between this genus and *Aphododerus*.

36. APHODODERUS COOKIANUS, *Jordan.*

Proc. Acad. Nat. Sci. Phila. 1877, p. 60.

Many specimens of this species are in the United States National Museum from various points in Illinois. The chief distinctive character of this species, the small size of the scales, seems to be constant.

Specimens of an *Aphododerus*, from near New Orleans, the original locality of *Aphredederus gibbosus* Le Sueur, seem to be identical with *A. sayanus.*

The etymology of "*Aphredoderus*" is apparently αφοδος, excrement; δερη, neck. The word should therefore be spelled *Aphododerus.*

37. ASTERNOTREMIA MESOTREMA, *sp. nov.*

General form, appearance, and coloration of *Asternotremia isolepis* Nelson, but the vent not as in the latter species between the anterior bases of the ventral fins, but about an eye's diameter in front of them. Head nearly 3 times in length; depth 3½; lateral line, 45 scales. Dorsal III, 8. Anal III, 7.

Type 9296, United States National Museum, from Georgia. Collector, Hugh M. Neisler; precise locality not indicated. Specimen 2¼ inches long, in very bad condition.

The peculiar position of the vent indicates a direct transition from the more generalized type of *Asternotremia* toward *Aphododerus.* In this species, it is about two-fifths of the distance between its normal position in the former genus and that of the latter, farther forward than in *Asternotremia isolepis.*

Since this paper was in press, I have received two more specimens which I refer to this species. They are in much better condition than the original types, and from them I am enabled to supplement and correct the original description.

Head 3 in length; depth 3⅛; eye 4 in head; distance to dorsal 2½ in body; base of dorsal 4.

Fin-rays:—D. III, 10; A. III, 6; V. 7. Scales in 60 to 70 rows, very small, and difficult to count.

Vent in front of the ventrals, about one-third the distance to the little knob at the throat.

Color precisely like that of the other members of the family.

Length of specimens 2¾ and 2½ inches respectively. They were taken in Little Red River, Arkansas, by Prof. H. S. Reynolds.

The species of this family now known are the following, beginning with the form least specialized :—

1. *Asternotremia isolepis* Nelson.—Illinois, both in tributaries of Lake Michigan and of the Ohio and Mississippi.

2. *Asternotremia mesotrema* Jordan.—Georgia to Arkansas.

3. *Aphododerus cookianus* Jordan.—Wabash Valley ; at various points both in Indiana and Illinois. Many specimens in United States National Museum.

4. *Aphododerus sayanus* (Gilliams) De Kay.—Streams coastwise, New York, New Jersey, south to Louisiana.

UMBRIDÆ

38. UMBRA PYGMÆA, (*De Kay*) *Bean*, MSS.

Leuciscus pygmæus, DE KAY, Fishes N. Y. 214 —STORER, Synopsis, 414.
Melanura pygmæa, BAIRD, Ninth Smithsonian Rept. 1855.
Fundulus fuscus, AYRES, Bost. Journ. Nat. Hist. iv, 296.—STORER, l. c. 431.
Umbra or *Melanura limi*, part, various authors (all quotations from Southern New York and streams of the Atlantic coast).

My friend Dr. T. H. Bean, of the Smithsonian Institution, calls my attention to the fact that the Mud Minnow of our eastern streams is quite a different species from the *Umbra* or *Melanura limi*, with which it has thus far been confounded by all writers who were aware of the relations of the fish. The synonymy of *M. pygmæa* is given above. Its characters are as follows :—

Head about 4 in length ; depth $4\frac{1}{2}$; body more terete and less compressed than in *M. limi;* head broader, less depressed, with larger eye ; interorbital space more convex ; snout shorter, profile more gibbous. Dorsal 13 ; anal 7 (dorsal 14, anal 8 in *M. limi*). Lateral line 35.

Coloration :—dark brown, a series of whitish lengthwise stripes along the rows of scales ; a black bar at base of caudal ; no traces of vertical bars ; blackish bands forward, downward, and backward from eye ; a dark vertebral band. *M. limi* is more mottled, not striped, and always shows pale vertical cross-bars. Specimens examined from Tarboro', N. C., and from points in New Jersey and New York. The smaller number of branchiostegals (four instead of five or six) is the only character known to separate *Melanura* from *Umbra*.

ESOCIDÆ.

39. ESOX NOBILIOR, *Thompson.*

? *Esox masquinongy*, MITCHILL, "Mirror, 1824, 297" (not there!).*
? *Esox estor*, RICHARDSON, Fauna Boreali-Americana, iii, 1836, p. 127; and of several authors (not of Le Sueur, Journ. Acad. Nat. Sci. i, 1818, 413).
Esox nobilior, THOMPSON, Proc. Bost. Soc. Nat. Hist. iii, 1850, 163, 173, 305; and of recent writers generally.

It is not quite clear why Dr. Mitchill's name for this species should be set aside. Günther remarks (Cat. Fishes Br. Mus. 1866, vi, 227), "Mitchill has counted seventeen anal rays, and therefore it is probable that his typical specimens belonged to this species (*E. lucius*) and not to *E. estor* (*nobilior*), and rejects Mitchill's name on the supposition that the number of rays in the Muskallunge is 20 or 21. But, in point of fact, the number of anal rays is 16 to 18, usually one less than in *E. lucius*", instead of 3 or 4 more. Moreover, Mitchill's specimen was about 4 feet in length and weighed 30 pounds, a size unusual for the Pike, although specimens even larger are occasionally taken. Mitchill supposed that the fish in his possession was the Muskallunge; he described it, and named it on that supposition.

The following description was taken from a specimen about 3 feet long from Ecorse, Mich. (No. 10607, National Museum), and from three smaller specimens from Lake Huron:—

Depth 6 in length; head $3\frac{2}{3}$; general form of *E. lucius*, the head perhaps a trifle larger proportionally, 10 inches long in the larger specimen; eye about midway in head. Interorbital space transversely concave, with a prominent middle ridge; maxillary reaching to opposite middle of orbit.

Scaly part of cheeks about as wide as eye, beginning on a level with the eye and running backward, its lower edge nearly parallel with the profile. Scaly region of opercles similar. The amount of squamation is variable within narrow limits. Eight rows of scales on cheeks and about the same number on opercles. Scales on lateral line 150.

Fin-radii:—B. 18–17; 17–17; 18–19; 17–17, in four specimens. D. III, 17; III, 17; III, 17. Anal, II, 15; III, 14; III, 15. V, 12.

Color dark gray; sides with round dark spots of a grayish-black hue, nearly the color of the back, on a ground-color of grayish silvery;

* A search through the files of the Mirror for Mitchill's description has proved unsuccessful: it is not on the page cited by Dekay.

belly white; fins black, spotted as in *E. lucius*. Nearly every writer who has mentioned the Muskallunge has confounded it more or less with *E. lucius*. Günther's statement, "body with large rounded whitish spots," applies to *E. lucius*, and not at all to *E. nobilior*, the color in the latter species being gray, with rounded blackish spots.

I have compared European and American examples of *Esox lucius*, and am unable to find any difference whatever.

DORYSOMATIDÆ.

40. DORYSOMA CEPEDIANA, (*Le S.*) *Gill.*

Subsp. HETERURA, (*Raf.*) *Jordan.*

Comparison of specimens of *Dorysoma* from the Wabash River with others from Chesapeake Bay have convinced me that all properly belong to one species, but that our inland form may be recognized as a subspecies, for which the name *heterura** may be retained. Var. *heterura* differs chiefly in form; the back is much less arched, the axis of the body in specimens of about a foot in length being about half nearer the dorsal than the ventral outline. In *cepediana*, the axis of the body is usually about midway. The greater arch of the back in *cepediana* brings the beginning of the dorsal fin nearer snout than base of caudal; in *heterura*, the dorsal is about midway. The dorsal filament is usually longer in *heterura*, commonly longer than head; in *cepediana*, it is usually shorter than head. The less elevated nape renders the head of *heterura* rather more slender.

The name *Dorysoma* may as well be spelled correctly in accordance with its etymology.

CYPRINIDÆ.

GENERA OF AMERICAN CYPRINIDÆ.

The following is a semi-artificial key to the genera of American *Cyprinidæ* which I am at present able to recognize.

Algoma Grd. I refer to *Hybognathus*, as one species which I have examined, *A. amara* has the alimentary canal elongate, and no characters

* *Clupea heterurus*, RAF., Am. Monthly Mag. Sept. 1818, 354, = *Dorosoma notata*, RAF., Ich. Ob. 1820, = *Chatoëssus ellipticus*, KIRT., 1838.

have been brought forward to distinguish *Algoma*. *Cliola* Grd. seems to be equivalent to *Episema* Cope & Jordan, the dentition and position of the dorsal being the same in both. *Notropis* Raf. is revived in place of *Alburnellus*, *Notropis atherinoides* being evidently *Alburnus rubellus* Ag., or some closely related species. *Sarcidium* I unite with *Phenacobius* without hesitation, on examination of the types of each. *Photogenis* Cope I retain for the present, rather from the fact of the utter dissimilarity of the species with those of *Nototropis* than from ability to show any good distinctive characters. It is perhaps questionable whether the development of the peculiar satin-white pigment, which is found in the fins of the males in spring in every species of *Photogenis* and *Cyprinella* known in life, and in no species of any other group (except *Codoma*, a very near affine of *Cyprinella*), may not be a true generic character.

In the genera proposed by Girard, I consider the species first mentioned as the intended type, as I believe it is a known fact that Girard himself so considered it. Some species referred to certain genera will be found not to agree with the characters here given. Several such species need a reëxamination. It may be premised that the present arrangement is to be considered merely temporary, as a step from the present condition of chaos toward solid ground.

*. Dorsal fin without a strong developed spine; ventral fins not decurrent on the abdomen; dentary bones slender, arched, and widely separated except at their symphysis; opercular and mandibular bones without externally visible cavernous chambers; pharyngeal teeth well developed:

†. Air-bladder suspended in the abdominal cavity and surrounded by many convolutions of the long alimentary canal (*Campostominæ*):

a. Teeth in the principal row 4–4, with oblique grinding surface and no hook; mouth inferior; lips sheathed; upper lip protractile; alimentary canal six to nine times length of body; sexual differences very great; males strongly tuberculate, CAMPOSTOMA, 1.

††. Air-bladder contiguous to the roof of the abdominal cavity and above the alimentary canal (*Leuciscinæ*):

‡. Rudimentary dorsal ray separated from first developed ray by membrane; head short, mouth small, inferior; upper jaw protractile; teeth 4–4, with grinding surface, not strongly hooked; males with the head tuberculate:

b. Alimentary canal elongate, two or three times length of body; teeth scarcely hooked; jaws normal:

c Lateral line incomplete ..... PIMEPHALES, 2.

cc. Lateral line complete ..... HYBORHYNCHUS, 3.

bb. Alimentary canal short, about as long as body; teeth hooked; jaws with spoon-shaped bony expansions, somewhat as in *Tetraodon*, COCHLOGNATHUS, 4.

ii. Rudimentary dorsal ray attached:
d. Teeth not molar, in one or two rows:
e. Maxillary without barbel:
f. Teeth in the principal row 4–4:
g. Alimentary canal elongate, about four times length of body; teeth one-rowed, cultriform, with oblique grinding surface and little or no hook; premaxillary projectile; lips attenuate, without sheath; scales large:
h. Lateral line almost wanting; mouth oblique; dorsal in front of ventrals ..... COLISCUS, 5.
hh. Lateral line complete; mouth horizontal; dorsal over ventrals:
—. Teeth elongate with narrow grinding surface and no hook; body elongate ..... HYBOGNATHUS, 6.
— —. Teeth short, with rather broad grinding surface and slight hook; body short and rather stout; size small..... DIONDA, 7.
gg. Alimentary canal short, about as long as body; teeth raptatorial, usually strongly hooked:
i. Teeth with grinding surface developed, not crenate:
j. Dorsal fin beginning above ventrals (*i. e.*, above some part of base of ventrals); anal basis short:
—. Scales small, much longer than deep, with much of the surface exposed; body stout, compressed; teeth one-rowed, little hooked, the uppermost standing out above the surface of the bone; size large..... (Subgenus ?) ALGANSEA,* 8.
— —. Scales large, about as long as deep, the usual surface exposed; teeth one- or two-rowed, pretty strongly hooked; size usually quite small..... ..... (Subgenus ?) HYBOPSIS, 9.
— — —. Scales large, much deeper than long on the sides, the exposed surfaces very narrow; teeth one or two-rowed, strongly hooked; size moderate or large..... LUXILUS, 10.
jj. Dorsal fin beginning entirely behind ventrals, between ventrals and anal; anal basis elongate..... LYTHRURUS, 11.
ii. Teeth with the edges crenate; dorsal fin beginning over middle or last rays of ventrals; scales closely and smoothly imbricated; teeth one-rowed (*Moniana*) or two-rowed (*Cyprinella*), CYPRINELLA, 12.
iii. Teeth with edges entire and without grinding surface:
k. Lips thin, normal; lateral line complete:
l. Species of small size and weak organization, with the mouth little cleft:
m. Scales comparatively thick, closely and smoothly imbricated, so that the exposed surfaces are higher than long; dorsal fin beginning opposite between first and last ray of ventrals, rarely slightly posterior; mouth subinferior, somewhat oblique; males in spring developing a satin-white pigment in the tips of the vertical fins and in the skin of the abdomen; snout tuberculate; colors brilliant, pigmented, (Subgenus ?) PHOTOGENIS, 13.
mm. Scales thin, much exposed; no white satiny pigment (except in *Codoma ?*):

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* *A. tincella*, the type of *Algansea* (*Leuciscus tincella* C. T. V., Hist. Nat. des Poissons 323), the teeth are said to be 4–4. In some species referred to *Algansea*, they are These I refer for the present to *Myloleucus*, from the type of which genus they in having but one row of teeth.

n. Dorsal fin beginning entirely behind ventrals:

o. Body short and thick; the head almost globular; the mouth small, inferior; anal basis short..(Subgenus?) CODOMA, 14.

oo. Body elongate, with the mouth oblique, terminal, and the head more or less pointed; anal basis somewhat elongate, NOTOTROPIS, 15.

nn. Dorsal fin beginning above some part of ventrals; aspect of *Nototropis* ..... CLIOLA, 16.

ll. Species of large size, with the body much elongated, subcylindrical; the head elongated, and the mouth deeply cleft, *Esox*-like; scales not large; pharyngeal bones long and slender, the teeth slightly hooked (sometimes 4–5) (voracious species of large size and strong organization, aspect of *Gila*), PTYCHOCHEILUS, 17.

kk. Lips thin; lateral line incomplete or wanting.... PROTOPOBUS, 18.

kkk. Lips thick, fleshy, enlarged behind; mouth small, inferior; dorsal fin beginning slightly anterior to ventrals; teeth one-rowed; lateral line complete..... PHENACOMIUS, 19.

ff. Teeth in the principal row 4–5 or 5–5 (or 4–4 in some species referred to *Hemitremia*):

p. Lateral line incomplete:

q. Dorsal over ventrals; scales large; teeth with grinding surface; alimentary canal short..... HEMITREMIA, 19.

qq. Dorsal behind ventrals; scales small:

r. Teeth with grinding surface, one-rowed; alimentary canal long, CHROSOMUS, 20.

rr. Teeth without grinding surface, two-rowed; alimentary canal short..... PHOXINUS, 21.

pp. Lateral line complete:

s. Lips normal, without cartilaginous or bony sheath:

t. Anal basis not elongate—of 10 or fewer rays:

u. Teeth raptatorial, entire, without grinding surface:

v. Dorsal entirely behind ventrals; mouth large; scales small; body elongate; western species of large size with flattened head, arched back, and slender caudal peduncle (*Gila*) or eastern species of slender form and small size (*Clinostomus*) or western species of large size, intermediate in form and with the exposed surfaces of the scales broad (*Tigoma*), GILA, 22.

vv. Dorsal over ventrals; mouth smaller; body stout and heavy, SIBOMA, 23.

uu. Teeth not crenate, raptatorial, with grinding surface:

w. Dorsal over ventrals; body rather stout.....MYLOLEUCUS, 24.

ww. Dorsal entirely behind ventrals; body more elongate, compressed ..... CHEONDA,* 25.

tt. Anal basis elongate, of 11 to 25 rays; body much compressed; dorsal fin entirely behind ventrals; lateral line decurved, complete:

x. Teeth one-rowed, not serrate, sharp-pointed, with masticatory surface, little hooked; base of caudal with many accessory rays; body elongate, large..... LAVINIA, 26.

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*To this genus I refer at present *Tigoma pulchra*, *T. nigrescens*, and *T. gibbosa* of Girard. *Cheonda* differs from *Myloleucus* only in the more backward position of the dorsal and from *Gila* (*Tigoma*) in the presence of grinding surfaces on the teeth.

xx. Teeth one-rowed, with grinding surface, and the edges crenate-serrate; belly sub-carinate; alimentary canal elongate, NOTEMIGONUS, 27.

xxx. Teeth two-rowed, entire, without grinding surface; alimentary canal not elongate ..... RICHARDSONIUS, 28.

ss. Both jaws with a hard or cartilaginous brown horny plate, large and conspicuous; mouth inferior (*Chondrostomatinæ*):

—. Teeth 5–4, club-shaped, entire, terminating in a hook, with the inner (grinding) surface obliquely cut; anal fin elongate; dorsal fin over ventrals; caudal fin with the accessory rudimentary rays very largely developed; alimentary canal elongate (?) ..... ACROCHILUS, 29.

fff. Teeth usually 6–6, compressed, lanceolate, erect, very slightly bent inward, one-rowed; body elongate; jaws even; scales small; dorsal over ventrals; basal caudal rays largely developed; lower jaw sharp-edged, with a knob at the symphysis; no pseudobranchiæ; intestinal canal elongate; size large... ORTHODON, 30.

ffff. Teeth in the principal row 3–3, without grinding surface; isthmus very wide; dorsal behind ventrals ..... TIAROGA, 31.

ee. Maxillary provided with a small barbel:

y. Premaxillaries not projectile, the skin of the lip and front continuous; teeth in the principal row 4–4, without grinding surface; scales small; dorsal behind ventrals; barbel terminal: RHINICHTHYS, 32.

yy. Premaxillaries projectile, a groove separating the upper lip from the forehead:

s. Teeth without grinding surface:

a. Teeth in the principal row 4–4; barbels terminal:

b. Dorsal behind ventrals; scales small:

c. Lateral line incomplete ..... APOCOPE, 33.

cc. Lateral line complete ..... (Subgenus?) ERITREMA, 34.

bb. Dorsal fin over ventrals; lateral line complete ..... NOCOMIS, 35.

aa. Teeth in the principal row 4–5; barbels lateral:

d. Dorsal fin over ventrals; scales large, equal, (Subgenus?) LEUCOSOMUS, 36.

dd. Dorsal fin beginning over last rays of ventrals; scales smaller, crowded forward ..... SEMOTILUS, 37.

ss. Teeth with developed grinding surface:

e. Dorsal fin behind ventrals; scales small ..... AGOSIA, 38.

ee. Dorsal fin directly over ventrals; scales large:

f. Head compressed, rounded above ..... POGONICHTHYS, 39.

ff. Head broad, much depressed, nearly flat or concave above, resembling the head of a *Cyprinodont* ..... PLATYGOBIO, 40.

dd. Teeth molar, of the grinding type, without grooves or ridges, in three rows, the outer deciduous, 2 or 3, 2, 5—4, 2, 2 or 3; two or three of the teeth blunt and much enlarged; body elongate; head tapering:

—. Angle of mouth with a barbel; upper jaw freely protractile; dorsal over ventrals ..... MYLOCHILUS, 41.

— —. No barbel; upper jaw not protractile; dorsal beginning behind ventrals ..... MYLOPHARODON, 42.

Opercular and mandibular bones with external cavernous chambers; air-bladder normal; dentary bones not united; fins without spines (*Cœlophori*):

g. Teeth hooked, without grinding surface, 4–4 in the principal row; lips normal; no barbel; intestines short; dorsal over ventrals; mouth small ..... ERICYMBA, 43.

***. Dentary bones straight and flat, united throughout their length; mandible much contracted, incurved, tongue-like, a lobe on each side of it at base; air-bladder normal; bones of head not cavernous; fins without spines (*Exoglossinæ*):

h. Teeth hooked, without grinding surface, 4–4 in the principal row; dorsal slightly behind beginning of ventrals; no barbel; premaxillaries not projectile ..... EXOGLOSSUM, 44.

****. Dorsal fin with a strong spine composed of two, the posterior received into a longitudinal groove of the anterior; inner border of the ventral fins adherent to the body (*Plagopterinæ*):

i. Body with small scales; teeth hooked, without grinding surface, the principal row 4–4; no barbels; dorsal behind ventrals. LEPIDOMEDA, 45.

ii. Body entirely naked; teeth hooked, without grinding surface, the principal row 4–4; no barbels; dorsal behind ventrals ..... MEDA, 46.

iii. Body entirely naked; teeth hooked, without grinding surface, the principal row 5–4; a barbel at the extremity of the maxillary; dorsal behind ventrals ..... PLAGOPTERUS, 47.

*****. Pharyngeal teeth quite rudimental, replaced by a somewhat uneven ridge of the bone (*Graodontinæ*):

j. Dorsal fin short, without spinous ray, opposite ventrals; anal fin short; mouth small, without barbel, the upper jaw somewhat longer; alimentary canal short; scales of moderate size; lateral line complete ..... GRAODUS, 48.

41. LUXILUS SELENE, *sp. nov.*

A handsome and striking species allied to *L. cornutus*, but showing a tendency toward *Hybopsis*. Head short and stout, rounded above, 4½ in length, depth about the same; body much more elongate than in *cornutus*, and the head proportionally shorter; mouth oblique, terminal, lower jaw included; eye very large, 3 in head, wider than snout and than interorbital space; snout blunt, quite short.

Fin-rays:—Dorsal I, 8. Anal I, 7. Dorsal fin about midway of body, over ventrals; dorsal very high; pectorals reaching two-thirds of the distance to ventrals, the latter to vent. Scales large, the exposed surfaces much less narrowed than in *cornutus*, 4–40–3, the lateral line little decurved.

Color bright steel-blue above, with a very distinct silvery band, which overlies a plumbeous shade; cheeks and belly silvery, a small, round, black caudal spot, a dark vertebral line; iris white; fins unmarked.

Teeth with marked masticatory surface, 2, 4–4, 2.

Length of specimen 4 inches.

Many specimens in United States National Museum; collected near Bayfield, Wis., by J. W. Milner.

This species seems to be distinct from all the numerous varieties of *L. cornutus* which I have examined.

42. LUXILUS ROSEUS, *sp. nov.*

Another handsome species, related to the last, but still more *Hybopsis*-like.

Body short, thick, and stout, much as in *Hyborhynchus notatus*; head $3\frac{7}{8}$ in length, depth $4\frac{1}{2}$; head rather short, thick, bluntly rounded; mouth moderate, slightly oblique; jaws about equal, the lower shutting within the upper in closed mouth; eye large, nearly 3 in head, about equal to snout, a little less than the broad interorbital space; scales large, 5–38–5, 15 before the dorsal fin, those along the sides with the exposed surfaces somewhat narrowed, but not very decidedly so, the arrangement being about midway between that observed in *L. cornutus* and that of the colored species of *Hybopsis*, such as *H. chrosomus*, *H. rubricroceus*, &c.

Fin-rays:—Dorsal I, 8. Anal I, 7. Dorsal fin high, inserted directly over ventrals, midway between snout and caudal; pectorals not reaching ventrals the latter to vent.

Color olivaceous above; scales dark-edged, a broad plumbeous lateral band passing through eye; lips black, a dark caudal spot, a dark vertebral line; anal region dusted with black points; cheeks and belly silvery; dorsal, anal, caudal, and most of pectorals rosy red; iris, top of head, and tip of snout also red; no tubercles on the type-specimens, which are probably immature, being about $2\frac{1}{2}$ inches in length.

Teeth 2, 4–4, 2, with developed grinding surfaces.

This small species forms a transition between *Luxilus* and *Hybopsis*.

Habitat.—Notalbany River, near Tickfaw, La.; collected December, 1876, by Dr. T. H. Bean. The types are now in the United States National Museum.

43. CYPRINELLA CALLIURA, *sp. nov.*

Body elongated, compressed, elevated in the middle, the profile before dorsal curved, and the snout projecting, forming a decided angle. Head convex above, densely tuberculate; muzzle rather pointed, overhanging the oblique mouth. Eye 4 in head, $1\frac{1}{3}$ in muzzle, $1\frac{2}{3}$ in interorbital width. Head $4\frac{2}{5}$ in length; depth $3\frac{3}{4}$ to 4.

Fin-rays:—D. I, 8; A. I, 8; V, 8. Dorsal fin inserted slightly behind ventrals; pectorals scarcely reaching $\frac{2}{3}$ to ventrals, the latter to vent.

Scales moderately elevated, 6–44–3; lateral line strongly decurved, forming an abrupt flexure just before the ventrals,—a peculiarity usually well marked and characteristic.

Teeth 1, 4–4, 1, strongly crenate.

Color in spirits pale; sides silvery; a pretty distinct black blotch on last rays of dorsal, as in *C. analostana;* a large, distinct, black caudal spot, ovate in form, half larger than eye, and extending up on the middle rays of caudal; the coloration therefore nearly that of *Photogenis stigmaturus.*

Length $4\frac{1}{2}$ inches.

Types, No. 6865, United States National Museum, from Black Warrior River, Alabama. Collector, Prof. Winchell. Many specimens. Other specimens from Tangipahoa River, Louisiana, are also in the collection.

The species seems to resemble *C. cercostigma* Cope most, having a similar coloration; but that species is said to possess the teeth 2, 4, and to have somewhat different proportions. Several other similarly colored species of *Photogenis* and *Cyprinella* inhabit our southwestern waters.

44. PHOTOGENIS GRANDIPINNIS, *sp. nov.*

Body short, much compressed; back elevated; the form generally that of a young *Notemigonus.* Depth 4 in length. Head short, $4\frac{1}{4}$ in length, pointed, flattened above; mouth large, very oblique, the jaws just equal; eye large, 3 in head, about equal to snout and to interorbital space.

Fin-rays:—Dorsal I, 8; anal I, 10 or 11. Dorsal fin entirely posterior to ventrals, midway between eye and base of caudal, the fin greatly elevated, the longest ray being a little longer than head; anal fin also greatly elevated, reaching to within one eye's diameter of base of caudal; in smaller specimens less elevated, but in all very large, larger than in any other Cyprinoid known to me.

Scales with the exposed edges very narrow, 6–35–3; 16 large scales before dorsal; lateral line much decurved.

Color disappearing in alcohol; dorsal fin with the large black blotch, found in all the species of this group, unusually large and distinct, spreading forward on the anterior rays; a distinct black caudal spot, smaller than eye and deeper than long, running up on the middle rays; sides shining plumbeous; a very distinct bright silvery band from upper half

of eye straight to upper half of caudal, passing around the nose; below this sharply dusky; the opercles, lower half of eye, and lips in the dark band.

Teeth 1, 4–4, 1, hooked and sharp-edged.

Types, No. 9296, United States National Museum, from Georgia. Collector, Hugh M. Neisler; exact locality not specified. Numerous specimens in poor condition, showing no trace of tubercles.

Length 2½ inches.

This small, handsome species is related to *P. pyrrhomelas* and *P. xænurus*, but needs no special comparison with either. The small size, the coloration, and immense development of the dorsal and anal fins distinguish it completely.

45. SEMOTILUS THOREAUIANUS, *sp. nov.*

Body short and rather stout, rather abruptly narrowed behind dorsal; depth 3¾ to 4½ in length. Head short and thick, 3¾ in length, almost round in the larger specimen. Mouth large, oblique, the jaws about equal. Barbel lateral, better developed than in *S. corporalis*. Eye small, 4½ to 5 in head, 1⅓ in snout, about 2 in interorbital space, cheeks swollen; snout in a small male specimen 3 inches long, with a bilobed tubercle on each side.

Fin-rays:—Dorsal I, 8; anal I, 7. Dorsal entirely behind ventrals, its last ray over the first of anal; caudal peduncle slender; fins all short; pectorals not reaching nearly to ventrals, the latter not to vent.

Scales larger than in *S. corporalis*, not much crowded forward, 5–48–9; lateral line much decurved.

Coloration of *S. corporalis*, the black dorsal spot distinct.

Types, No. 9296, United States National Museum, from "Georgia". Collector, Hugh M. Neisler. Two specimens, the longest 3¾ inches long.

This species differs from *Semotilus corporalis* in its large scales, more backward dorsal, short head, and small size. The number of scales in the lateral line will probably always distinguish it.

This species is named in honor of the late Henry David Thoreau, of Concord, Mass., an excellent ichthyologist, one of the first to say a good word for the study of Cyprinidæ.*

* I am the wiser in respect to all knowledge, and the better qualified for all fortunes, for knowing that there is a minnow in the brook. Methinks I have need even of his sympathy and to be his fellow in a degree. * *

I would know even the number of their fin-rays, and how many scales compose the lateral line.—(Thoreau, Essay on Nat. Hist. Mass. 1842. <Excursions, ed. 1863, p. 56.)

46. NOCOMIS MILNERI, *sp. nov.*

Form somewhat of *Semotilus corporalis*, but more terete and elongate; depth $4\frac{1}{2}$ in length. Head about the same, flattish above, with a broad snout, which projects over the large, oblique mouth; barbel very apparent. Eye large, equal to snout, $3\frac{2}{3}$ in head, $1\frac{1}{2}$ in interorbital space; dorsal beginning over last rays of ventrals, I, 8; anal I, 8.

Scales quite small, crowded forward, as in *Semotilus corporalis*, 11-68-7, or thereabouts.

Colors of *Semotilus corporalis*, but the fins unspotted; a faint black band passing around snout through eye, somewhat silvery below.

Teeth 2, 4–4, 2, without grinding surface; length 4 to 6 inches.

Types, No. 130, United States National Museum. Collected in Lake Superior, by J. W. Milner, of the United States Fish Commission, for whom the species is named.

This species may be known from *N. prosthemius* Cope by the larger scales and different mouth. Specimens of the latter are in the National Museum, from Evanston, Ill. *Gobio plumbeus* Ag., I do not know; the present species appears to be different.

47. CLIOLA ARIOMMA, (*Cope*) *Jordan.*

Photogenis ariommus, Cope, Trans. Am. Phila. Soc. 1866, 378.

This species is a true *Cliola* as I have defined that genus. The colored species referred by Prof. Cope and myself to *Episema*, viz, *E. callisema* and *E. pyrrhomelas*, are to be placed in *Photogenis* as defined in this paper. Their natural affinities are entirely with the latter group.

48. HYBOGNATHUS REGIUS, *Girard.*

Proc. Acad. Nat. Sci. Phila. 1856, 209.

This species, which has been for some time wrongly referred to *Hybopsis*, is a true *Hybognathus*, having the long intestines and cultriform pharyngeal teeth characteristic of the former genus. This fact was pointed out to me by Dr. T. H. Bean, who is now doing some very useful work in the way of verification of ascribed characters. *Hybognathus osmerinus* Cope is, so far as I can see on comparison of typical specimens, identical with *H. argyritis* Grd. *H. regius* is larger and deeper-bodied; *H. nuchalis* smaller.

49. NOTEMIGONUS CHRYSOLEUCUS, (*Mitchill*) *Jordan.*

In the Annals of the Lyceum of Natural History of New York for the present year, I have described as new a species of the genus *Notemigonus* from the Ocmulgee River, Georgia, under the name of *Notemigonus ischanus*, the description being drawn from a large number of young specimens.

I have lately had the opportunity of examining a number of fine adult individuals of this species from the same river. Prof. Cope has also obtained specimens from the St. John's River in Florida.

This species differs from the common *Notemigonus "americanus"* of the North and West chiefly in the following respects: (*a*) in the much greater size of the anal fin, the number of rays ranging from I, 15, to I, 17; (*b*) in the greater compression of the body, which at the same time is also more elongate; (*c*) in the larger eye; (*d*) in the rather more pointed head; and (*e*) in the coloration, the sides of the body in adult males being more or less rosy, and the lower fins, especially the ventrals, orange, verging on blood-red at their tips.

Linnæus's original description of his *Cyprinus americanus* is as follows (Systema Naturæ, ed. x, 1758, p. 321):

Americanus 4. C. pinna ani radiis . . . , cirris plurimis.
Catesb. car. 2. *p.* 12. *t.* 12.
Alburnus americanus.
Habitat in America.

In the twelfth edition, 1766, p. 530, the following is substituted:

Americanus 23. C. pinna ani radiis xviii. B. 3. D. 9. P. 16. V. 9. A. 18. C. 27.
Habitat in Carolina. D. Gardeu.
Corpus rutili, cæruleo-argenteum. Linea lateralis admodum arcuata versus abdomen. Canda bifida.

From this latter description, it is evident that the fish which Linnæus had in mind was the southern *Notemigonus ischanus*, rather than the northern so-called *americanus*, which, by the way, is not certainly known to occur in Carolina.

Wherefore the southern species, *Notemigonus ischanus* Jordan, should be known as *Notemigonus americanus*, and the species of the Northern States, Great Lake Region, and Mississippi Valley as *Notemigonus chrysoleucus*, the name of *Cyprinus chrysoleucus* Mitchill being the oldest tenable name applied to it so far as known to the writer.

Leuciscus boscii Cuv. & Val. is probably identical with *Notemigonus*

americanus. Prof. Cope states that it is "probably a *Lavinia*", but he has not yet given us the grounds for his opinion. The figure of Cuvier and Valenciennes certainly bears little resemblance to *Lavinia*.

50. PLATYGOBIO GRACILIS, (*Richardson*) *Gill & Jordan.*

Cyprinus (*Leuciscus*) *gracilis*, RICHARDSON (1836), Fauna Boreali-Americana, iii, p. 120 (*Leuciscus gracilis* of copyists).

Leucosomus gracilis, HECKEL (1843), Fische Syriens, p. 52 (= Russeger's Reisen, p. 1042).

Pogonichthys communis, GIRARD (1856), Proc. Acad. Nat. Sci. Phila. p. 188, and elsewhere.

Platygobio communis, GILL (1876), Ichthyology, Capt. Simpson's Expl. p. 408, and and in previous papers.

Leucosomus communis, GÜNTHER (1867), Cat. Fishes Brit. Mus. vii, p. —.

Comparison of various specimens of *Platygobio communis*, from Milk River, Montana, and elsewhere, with Richardson's description and figure of *Leuciscus gracilis*, leaves no doubt of the identity of the two species.

CATOSTOMIDÆ.

51. MYXOSTOMA PŒCILURA, *sp. nov.*

Form and general characters of *Myxostoma duquesnii*: Body rather elongate, somewhat elevated forward, moderately compressed; the greatest depth $4\frac{1}{3}$ in length; eye medium, $4\frac{1}{2}$ in length; mouth moderate; the lips plicate, rather full and subtruncate behind, as in *M. aureola*, *duquesnii*, etc.

Dorsal fin medium, of 13 developed rays; anal high, reaching when depressed considerably beyond base of caudal in one specimen, falling short in the other; pectoral fins rather long; ventrals with ten rays.

Caudal fin peculiar, strongly forked, the lower lobe in both the types being considerably longer and stronger than the upper lobe.

Scales large, 5–43–4.

Coloration of the body usual; of the fins quite unlike any other member of the genus.

Dorsal fin (in the type-specimens preserved in alcohol) chiefly red, with traces of a blackish bar about half-way up; pectorals chiefly red, whitish in front, with a large, elongate, diffuse black blotch near the middle; ventrals reddish, blackish toward their base; anal faintly reddish; the membrane black.

Upper lobe of the caudal fin red; lower lobe chiefly jet-black, except the last two developed rays and their membranes, which are abruptly

white. This produces a peculiar feature of coloration singular in this family, resembling in some slight degree that of the Cyprinodont genus *Xiphophorus*.

Types: Two specimens, numbered 16928 in the United States National Museum; collected by Mr. Fred. Mather in the Tangipâhoa River, in Louisiana. The larger specimen is 10 inches long.

HYODONTIDÆ.

52. HYODON SELENOPS, *Jordan & Bean, sp. nov.*

Three well-marked species of the genus *Hyodon* inhabit the fresh waters of the United States, viz: *Hyodon chrysopsis* Richardson, of the water-basins of the Saskatchewan and Upper Missouri; *Hyodon tergisus* Le Sueur, the common "Moon-Eye" of the Great Lake region and Upper Mississippi; and an undescribed species for which the name of *Hyodon selenops* is suggested, inhabiting the waters of the Southern States. The various synonyms, *Hyodon clodalus* Le Sueur, *Abramis smithii* Rich., *Hyodon amphiodon*, *alosoides*, *heterurus*, and *vernalis* Raf., evidently belong to the common *Hyodon tergisus*, so that the proper nomenclature of these species is a simple matter.

Hyodon selenops is distinguished from the others by the more elongate body, which is less compressed than usual, and there is less difference between the curve of the back and that of the belly. The belly anterior to the ventral fins is transversely rounded, or even almost flattened instead of being obtusely carinated as in *H. tergisus*, or sharply carinated as in *H. chrysopsis*.

So strongly do *H. selenops* and *H. chrysopsis* differ in this respect that they would be considered as belonging to different genera were not the intermediate type *H. tergisus* still extant. Prof. Gill considers that, in the interests of conciseness of expression, the modifications of structure in the group should be expressed by at least subgeneric appellations, and in this I concur with him. Prof. Gill and myself, therefore, propose the new subgeneric term *Elattonistius* (ἐλάττον, smaller; ἱστιος, banner—*i. e.*, dorsal fin) for the *Hyodon chrysopsis*, and assign the characters given in the annexed synopsis. The scales are much less closely imbricated in *H. selenops*, and the number of series is, therefore, fewer. The dorsal fin is comparatively large, and nearly as long as high in front as in *H. tergisus*, and the pectoral fins are short, as in the latter species. But the most striking difference is in the size of the eye, which is exceed-

ingly large, forming nearly half the length of the side of the head in the smaller specimen, and about two-fifths in the larger.

The type of *H. selenops* is No. 19844 in the United States National Museum, from Chattanooga, Tenn.; length 8 inches. Another is from Montgomery, Ala.; and I have seen still others from the Cumberland River.

The following analysis of the species of *Hyodon* is drawn up from numerous specimens of *H. chrysopsis* taken by Dr. Elliott Coues, naturalist of the northern boundary survey, in Quaking Ash River; from specimens of *H. tergisus* from Ohio, and from the types of *H. selenops*. It will be noticed that the characters of *H. tergisus* are exactly intermediate, corresponding with the geographical range of the species. *H. chrysopsis* and *H. selenops* are, therefore, geographical races or varieties which have become so strongly differentiated from the common type that we are able to characterize them as species:

*. Dorsal fin reduced, and with only about nine fully developed rays; abdomen sharply carinated (*Elattonistius*):

†. Dorsal fin very small, of about nine *developed* rays (besides the two or three rudiments), the length of its longest rays half greater than the length of the base of the fin; body deep, closely compressed; the belly strongly carinated both before and behind ventrals; eye moderate (about 3½ in head); scales rather closely imbricated, 5–58–8; pectoral fins falcate nearly as long as the head, nearly or quite reaching ventrals; anal with 30 or 31 developed rays; head 4½ in length; depth 3¼ ..... CHRYSOPSIS.

**. Dorsal fin moderate and with eleven or twelve fully developed rays; abdomen more or less obtuse (*Hyodon*):

†. Dorsal fin larger, of about 12 developed rays; its longest rays scarcely longer than the base of the fin; form of body intermediate; the belly in front of ventrals obtusely carinated; eye large, about 3 in head; scales medium, 5–58–8; pectoral fins decidedly shorter than head, not reaching nearly to ventrals; anal rays 28 or 29; head 4½ in length, the depth about 3 ..... TERGISUS.

††. Dorsal fin moderate, of 11 or 12 developed rays, nearly as long as high in front; body elongate, not greatly compressed; the belly in front of ventrals transversely rounded, not carinated; eye very large, about 2½ in head; scales loosly imbricated, 4–50–7; pectoral fins considerably shorter than head, not reaching nearly to ventrals; anal rays 27; head 4½ in length; depth about 4 ..... SELENOPS.

B.—SYNOPSIS OF THE FRESH-WATER SILURIDÆ OF THE UNITED STATES.

The nomenclature of the *Siluridæ* of our fresh waters has been for a long time in a very unsettled state, owing to the accumulation in our descriptive works of a large number of nominal species, and to the general lack of sharp characterizations in the published descriptions.

The writer has attempted to go over the subject critically, with a view to ascertaining the basis on which each species rests, and to eliminating all those whose claims to recognition are doubtful. I have accordingly considered every nominal species as invalid, unless either from the description itself or from the examination of specimens, some differences apparently permanent could be appreciated. Some species not here recognized will doubtless prove valid, but at least nine-tenths of those not admitted are simply spurious, either based on individual peculiarities of specimens, or more often on ignorance of species previously described.

This paper is based primarily on the collections in the United States National Museum. The writer has also examined most of the specimens of *Siluridæ* preserved in the Museum of the Academy of Natural Sciences at Philadelphia. Most of the species here recorded are also in the author's own collection, deposited in the Museum of Butler University at Indianapolis, Ind.

The drawings accompanying this paper were nearly all made by Mr. Ernest R. Copeland from specimens in the author's collection. Those of *Amiurus nigrilabris*, *Amiurus mispilliensis*, and *Amiurus niveiventris* were drawn by Miss Belle Sherman from Prof. Cope's types in the Museum of the Academy. A few others were drawn by Mr. Todd from specimens in the National Museum. These drawings are to be considered rather as illustrative diagrams than as pictures. They are drawn with a view to showing especially those characters which I consider to be specific in our *Siluridæ*, viz. the general outline, the position of the dorsal fin, the size, number of rays, and position of the anal fin, the form of the caudal fin, and the size and form of the pectoral spines. These features

have in all cases been drawn with considerable care and regard to accuracy.

The writer is under great obligations to Prof. Theodore Gill, of the Smithsonian Institution, for aid of various kinds, both in his work on the *Siluridæ* and in the prosecution of his ichthyological studies generally.

In the following descriptions, the "length of the body" is always measured along the sides from the snout to the middle of the *base* of the caudal fin.

All of our species of fresh water *Siluridæ* belong to the group called, by Dr. Gill, in 1862, ICTALURI. In 1864, Dr. Günther recognized the same group; but "to show his originality", as Prof. Agassiz used to say, he, without assigned reason, changed the name to *Amiurina*.

The following are the characters ascribed by Prof. Gill to the *Ictaluri* (Report on Ichthyology, Captain Simpson's Explorations across the Great Basin of Utah in 1859, p. 416).

GROUP ICHTHÆLURI.

The body is more or less elongated, compressed posteriorly, and terminating in a well-developed caudal fin. The skin is naked and unprovided with sucking cups.

The head in profile presents the appearance of a more or less elongated cone, and is covered with a skin which is generally quite thick. It is more or less flattened, and broad above, and gradually becomes narrowed to the convex snout. There is never a casque, or helmet. The supraoccipital terminates in a point.

There are eight barbels: the two maxillary, constant in the family; a pair in front of the posterior nasal apertures; and two pairs arranged in a curved line behind the lower jaw.

The nostrils form nearly a transverse parallelogram between the intermaxillaries and the eyes; the anterior are suboval or subcircular, and the posterior linear, with a raised margin, from the front of which the upper barbels originate.

The eyes are generally placed in the anterior half of the head.

The branchial apertures are ample, continued from the supero-posterior angles of the opercula to beneath the throat.

The group of *Ichthælurí* consists of four genera: *Ichthælurus*, *Amiurus*, *Pelodichthys*, and *Noturus*. All the species known to be genuine members of this group are North American, and all are included in the

wing synopsis. A Chinese species, *Pimelodus cantonensis*, referred Dr. Günther to *Amiurus*, is excluded, as its real position is perhaps rtain. The species are most abundant in the Mississippi Valley Great Lake Region. Some of them occur in all our waters east of Rocky Mountains, but as yet none are known from the Pacific e.

ANALYSIS OF THE GENERA OF ICHTHÆLURI.

pose fin with its posterior margin free, not connected with the caudal fin:
ntermaxillary band of teeth convex in front, abruptly truncate behind, without lateral backward processes; branchiostegals 8 or 9 (rarely 10 or 11); ventral fins normally with 8 rays:
Supraoccipital bone prolonged backward, its apex emarginate, receiving the pointed anterior end of the second interspinal, thus forming a continuous bony bridge from the snout to the base of the dorsal; branchiostegals 8 or 9; head elongate; mouth small, terminal, the upper jaw the longer; anal fin elongate, of 24 to 34 rays; caudal fin furcate; body elongate, more or less slender, silvery, covered with thin skin.....ICHTHÆLURUS.
. Supraoccipital bone free behind, not connected with the interspinal; branchiostegals normally 9 (varying from 8 to 11); head broad; mouth broad, terminal; anal fin moderate or rather long, with 15 to 27 rays; caudal fin usually truncate, but often more or less deeply emarginate or even forked; body usually more or less shortened, covered with a rather thick skin.....AMIURUS.
ntermaxillary band of teeth convex in front, with a lateral backward extension on each side; branchiostegals normally 12; supraoccipital bone free behind; head long, broad, and flat; mouth large, the lower jaw always the longer; anal fin short, of 12 to 14 rays; ventrals with 9 rays; caudal fin truncate, its numerous rudimentary rays recurrent above and below the caudal peduncle; number of vertebræ increased; body elongate, covered with thick skin....PELODICHTHYS.
lipose fin long and low, keel-like, adnate to the back, more or less perfectly continuous with the caudal fin; supraoccipital bone free behind; branchiostegals 9; anal fin short, with 11 to 20 rays; caudal fin rounded, with numerous rudimentary rays recurrent on the caudal peduncle; ventral rays usually 9; form various, but body usually more or less elongate, depressed in front, compressed behind, covered with a thickish but semi-transparent skin; size small, NOTURUS.

CATALOGUE OF NOMINAL SPECIES, WITH IDENTIFICATIONS.

the following list are given, in chronological order, the names thus roposed for our fresh-water *Siluridæ*. In the right-hand column is dentification of each species. Those species of which I have exed the original types are designated by a star (*).

Nominal species.	Date.	Identification.
s catus, L.	1758	Amiurus catus.
s gyrinus, Mit	1817	Noturus gyrinus.
s punctatus, Raf	1818	Ichthælurus punctatus.
s olivaris, Raf	1818	Pelodichthys olivaris.
rus flavus, Raf	1818	Noturus flavus.

Nominal species.	Date.	Identification.
Pimelodus albidus, Le Sueur	1819	Amiurus albidus.
Pimelodus nebulosus, Le S	1819	Amiurus catus.
Pimelodus æneus, Le S	1819	Pelodichthys olivaris.
Pimelodus caudafurcatus, Le S	1819	Ichthælurus punctatus.
Pimelodus nigricans, Le S	1819	Amiurus nigricans.
Pimelodus natalis, Le S	1819	Amiurus natalis.
Noturus luteus, Raf	1819	Noturus flavus.
Pilodictis limosus, Raf	1819	Pelodichthys olivaris.
Silurus maculatus, Raf	1820	Ichthælurus punctatus.
Var. erythroptera, Raf	1820	Ichthælurus punctatus.
Silurus pallidus, Raf	1820	Ichthælurus punctatus.
Var. marginatus, Raf	1820	Ichthælurus punctatus.
Var. lateralis, Raf	1820	Ichthælurus punctatus.
Var. leucoptera, Raf	1820	Ichthælurus punctatus.
Silurus cerulescens, Raf	1820	Ichthælurus punctatus.
Var. melanurus, Raf	1820	Ichthælurus punctatus.
Silurus argentinus, Raf	1820	Ichthælurus punctatus.
Silurus nebulosus, Raf	1820	Pelodichthys olivaris.
Silurus viscosus, Raf	1820	Pelodichthys olivaris.
Silurus lividus, Raf	1820	Amiurus natalis lividus.
Var. fuscatus, Raf	1820	Amiurus natalis lividus.
Silurus melas, Raf	1820	Amiurus melas.
Silurus cupreus, Raf	1820	Amiurus lividus cupreus.
Silurus xanthocephalus, Raf	1820	Amiurus xanthocephalus.
Silurus limosus, Raf	1820	Pelodichthys olivaris.
Pimelodus argyrus, Raf	1820	Ichthælurus punctatus.
Pimelodus lutescens, Raf	1832	Pelodichthys olivaris.
Pimelodus insigne, Rich	1836	Noturus insignis.
Silurus (Pimelodus) cœnosus, Rich	1836	Amiurus natalis cœnosus.
Silurus (Pimelodus) nigrescens, Rich	1836	Amiurus nigricans.
Silurus (Pimelodus) borealis, Rich	1836	Amiurus borealis.
Pimelodus punctulatus, Cuv. & Val	1840	Pelodichthys olivaris.
Pimelodus furcatus, Cuv. & Val	1840	Ichthælurus furcatus.
Pimelodus furcifer, Cuv. & Val	1840	Ichthælurus punctatus.
Pimelodus lemniscatus, Le Sueur	1840	Noturus insignis.
Pimelodus vulgaris, Thompson	1842	Amiurus vulgaris.
Pimelodus pullus, De Kay	1842	Amiurus pullus.
Pimelodus atrarius, De Kay	1842	Amiurus catus.
Pimelodus felis, Agassiz	1850	Amiurus catus.
Pimelodus gracilis, Hough*	1852	Ichthælurus punctatus.
Pimelodus marmoratus, Holbrook*	1855	Amiurus marmoratus.
Pimelodus vulpes, Grd.*	1858	Ichthælurus punctatus.
Pimelodus catulus, Grd.*	1858	Amiurus melas.

Nominal species.	Date.	Identification.
Pimelodus felinus, Grd.*	1858	Amiurus natalis lividus.
Pimelodus antoniensis, Grd.*	1858	Amiurus natalis antoniensis.
Pimelodus ailurus, Grd*	1858	Amiurus vulgaris ælurus.
Pimelodus lupus, Grd*	1858	Amiurus lupus.
Pimelodus olivaceus, Grd.*	1858	Ichthælurus punctatus.
Pimelodus affinis, Grd*	1859	Ichthælurus furcatus.
Synechoglanis beadlei, Gill*	1859	Ichthælurus punctatus.
Pimelodus houghi, Grd.*	1859	Ichthælurus punctatus.
Pimelodus hoyi, Grd.*	1859	Amiurus catus.
Pimelodus confinis, Grd.*	1859	Amiurus melas.
Pimelodus cupreoides, Grd*	1859	Amiurus natalis lividus.
Pimelodus dekayi, Grd	1859	Amiurus vulgaris.
Pimelodus lynx, Grd*	1859	Amiurus albidus.
Pimelodus puma, Grd*	1859	Amiurus natalis.
Pimelodus vulpeculus, Grd.*	1859	Amiurus catus.
Pimelodus platycephalus, Grd *	1859	Amiurus platycephalus.
Pimelodus megalops, Grd*	1859	Ichthælurus punctatus
Pimelodus graciosus, Grd*	1859	Ichthælurus punctatus.
Pimelodus hammondi, Abbott	1860	Ichthælurus punctatus.
Pimelodus notatus, Abbott	1860	Ichthælurus punctatus.
Ictalurus simpsoni, Gill *	1861	Ichthælurus punctatus.
Amiurus obesus, Gill *	1861	Amiurus melas.
Noturus occidentalis, Gill *	1861	Noturus flavus.
Amiurus meridionalis, Günther	1864	Ichthælurus meridionalis.
Noturus platycephalus, Gthr	1864	Noturus flavus.
Gronias nigrilabris, Cope*	1864	Amiurus nigrilabris.
Noturus marginatus, Baird*	1869	Noturus insignis.
Ictalurus kevinskii, Stauffer	1869	Amiurus albidus.
Ictalurus macaskeyi, Stauffer	1869	Amiurus albidus.
Amiurus mispilliensis, Cope	1870	Amiurus catus (mispilliensis.)
Amiurus lophius, Cope	1870	Amiurus lophius.
Amiurus niveiventris, Cope	1870	Amiurus niveiventris.
Noturus exilis, Nelson*	1876	Noturus exilis.
Noturus leptacanthus, Jordan*	1877	Noturus leptacanthus.
Amiurus brunneus, Jordan*	1877	Amiurus brunneus.
Noturus miurus, Jordan*	1877	Noturus miurus.
Noturus eleutherus, Jordan	1877	Noturus eleutherus.
Ichthælurus robustus, Jordan*	1877	Ichthælurus robustus.
Amiurus erebennus, Jordan*	1877	Amiurus erebennus.
Amiurus natalis analis, Jordan	1877	Amiurus natalis analis.
Noturus sialis, Jordan	1877	Noturus sialis.

GENUS ICHTHÆLURUS,* (*Rafinesque*) *Gill.*

Ictalurus, RAFINESQUE (1820), Ichthyologia Ohiensis, 61.
Elliops, RAFINESQUE (1820), Ichthyologia Ohiensis, 62.
Synechoglanis, GILL (1859), Annals Lyc. Nat. Hist. vii, 39.
Ictalurus, GILL (1862), Proc. Boston Soc. Nat. Hist. 41.
Ichthælurus, COPE (1869), Journ. Acad. Nat. Sci. Phila. 237.

ETYMOLOGY.—ιχθυς, fish; αιλουρος, cat.
TYPE.—*Silurus punctatus*, Rafinesque.

Body elongated, slender, and much compressed. The caudal peduncle is short but slender, and presents behind the anal an elongated elliptical section.

Head conical in profile, compressed, and with the sides sloping downward and outward. The supraoccipital bone is prolonged backward, and its emarginated apex receives the acuminate anterior point of the second interspinal. The skull is covered by a thin tense skin, through which the sculpture of the bones is apparent. Eyes large and almost entirely lateral. Mouth small, transverse, and terminal. The upper jaw protrudes beyond the lower. Teeth subulate and aggregated into a short, laterally truncated band on each jaw. Branchiostegal rays, 8 or 9. Dorsal fin situated over the interval between the pectoral and ventral fins, higher than long, with one long spine and usually six articulated rays. Adipose fin pedunculated over the posterior portion of the anal. Anal fin long, and provided with from 25 to 35 rays; it commences near the anus. Ventral fins each with one simple and seven branched rays. Pectoral fins each with a stout spine, retrorse-serrate within, and about nine branched rays. The serræ of the pectoral spine vary with age and circumstances, and do not in this genus give good specific characters. Caudal fin elongated and deeply forked, with the lobes equal and pointed.

The genus *Ichthælurus* is at once recognized by the forked caudal fin, its silvery or olivaceous colors, and by its compressed, elongated, and slender body, which give to it a peculiarly graceful appearance, very unlike that of the stout, obese, and large-headed *Amiuri*. The head is smaller in proportion than in *Amiurus*, more compressed, and not covered by so thick a skin; the mouth is proportionally much smaller. But the only invariable generic distinction resides in the mode of inser-

* The characters of the genera of *Siluridæ* as here given are arranged from Prof. Gill's Report on Ichthyology of Captain Simpson's Explorations Across the Great Basin of Utah, pp. 416–431, with some additions and modifications.

tion of the supraoccipital or interparietal bone into the head of the second interspinal. A firm and immovable bridge is thus formed, which gives an uninterrupted passage from the dorsal fin to the snout. The silvery coloration is also a marked distinguishing feature.

It is not generally true that the species of *Ichthælurus* reach a larger size than those of the other genera. *Amiurus nigricans* and *Pelodichthys olivaris* far exceed in size any of the species of *Ichthælurus*.

ANALYSIS OF SPECIES.*

*. Anal fin extremely elongate, its base about one-third the length of the body (without caudal); its rays 32 to 34 in number; eye small, wholly anterior, the middle of the head being entirely behind its posterior margin; head small, about 4½ in length; depth 4 in adults to 5½ in younger specimens; slope from dorsal to snout somewhat concave, especially in adults; pectoral spine 1½ in head; skin thin; color brightly silvery ..... FURCATUS, 1.

**. Anal fin shorter, 3½ to 4 in length; its rays 24 to 30.

†. Eye moderate-sized, anterior, the middle of the head being wholly behind it; anal rays 27 to 30; body comparatively stout and deep, compressed behind; the dorsal region elevated; depth 3½ to 4 in length; head pretty large, 4½ to 4½ in length, one-third longer than broad; spines moderate, strong, little more than half-head; profile from dorsal to snout more or less depressed or concave; skin rather thick; colors pale ..... ROBUSTUS, 2.

††. Eye large, placed mesially, the middle of the length of the head falling within the eye; anal rays 25 to 29; head moderate, about 4 in length; depth about 5; body more elongate and less deep than in *robustus*, the head rather smaller, the eye larger, and the dorsal region less elevated; pectoral and dorsal spines long, each about 1⅔ in length of head ..... PUNCTATUS, 3.

1. ICHTHÆLURUS FURCATUS, (*Cuv. & Val.*) *Gill.*

Fork-tailed Channel Cat.

(Figs. 1 and 2.)

Pimelodus furcatus, CUV. & VAL. (1840), xv, 136.—DE KAY (1842), Fishes N. Y. 187.—STORER (1846), Synopsis, 403.

Ictalurus furcatus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 43.—JORDAN (1876), Man. Vert. 300.—JORDAN & COPELAND (1876), Check List, 159.

Amiurus furcatus, GÜNTHER (1864), Cat. Fishes, v, 103.

Pimelodus affinis, BAIRD & GIRARD (1854), Proc. Acad. Nat. Sci. Phila. 26.—GIRARD (1859), Ich. U. S. and Mex. Bound. 32.

Ictalurus affinis, GILL (1862), l. c. 43.—JORDAN & COPELAND, l. c. 159.

Amiurus affinis, GÜNTHER (1865), l. c. 103.

Habitat.—Mississippi Valley to Texas.

This species is not nearly so common nor so well known as the *punctatus*. I am unable to distinguish the type specimens of *affinis* from *furcatus*.

* *I. meridionalis* is here omitted, the description not being sufficiently full to allow a satisfactory contrast of its characters with those of *I. robustus*.

2. ICHTHÆLURUS ROBUSTUS, *Jordan, sp. nov.*

Robust Channel Cat.

(Figs. 3 and 4.)

Ictalurus furcatus, NELSON (1876), Bull. Ills. Mus. Nat. Hist. 50.

Habitat.—Ohio and Mississippi Rivers.

This is a large robust species said to be not uncommon in the Ohio and Mississippi Rivers, and which seems to have been thus far confounded with the related *I. furcatus.* From that species it differs obviously in the shorter anal fin, which has 27 to 30 rays, and forms but one-fourth of the length of the body, without the caudal. It is also a stouter fish, with a larger head and a more elevated dorsal region. From *I. punctatus* this species differs notably by the anterior position of the eyes and by the greater elevation of the dorsal region. Old specimens have the profile somewhat concave as in *I. furcatus.*

The type is a large specimen, about 18 inches long, numbered 20056 in the National Museum. The record of the locality is lost. Another specimen, figured in this paper, was sent me by Prof. S. A. Forbes, from the Ohio River at Cairo. Professor Forbes thinks it common in the Lower Ohio and Mississippi, but that it rarely ascends the Illinois and other tributary rivers.

3. ICHTHÆLURUS PUNCTATUS, (*Raf.*) *Jordan.*

Blue Cat—White Cat—Silver Cat—Channel Cat.

(Figs. 5 and 6.)

Silurus punctatus, RAF. (1818), Amer. Monthly Mag. and Critical Review, Sept. 359.

Ictalurus punctatus, JORDAN (1876), Bull. Buff. Soc. Nat. Hist. 95; (1876), Manual of Vertebrates, 300.—JORDAN & COPELAND (1876), Check List in Bull. Buff. Soc. Nat. Hist. 159.—JORDAN (1877), Annals Lyc. Nat. Hist. N. Y. —. —NELSON (1876), Bull. Ills. Mus. Nat. Hist. 50.

Pimelodus caudafurcatus, LE SUEUR (1819), Mémoires du Muséum, v, 152.

Amiurus caudafurcatus, GÜNTHER (1864), Catalogue of Fishes, v, 102.

Silurus maculatus, RAF. (1820), Quarterly Journal of Science, Literature, and Arts, London, 48 (et var. *erythroptera*, p. 49).

Pimelodus (*Ictalurus*) *maculatus*, RAF. (1820), Ichthyologia Ohiensis, 62.

Silurus pallidus, RAF. (1820), Quart. Journ. Sci. Lit. Arts London, 49 (et var. *marginatus, lateralis, leucoptera*).

Pimelodus pallidus, RAF. (1820), Ich. Oh. 63.—KIRTLAND (1838), Report Zool. Ohio, 169, 194.

Silurus cerulescens, RAF. (1820), Quart. Journ. Sci. Lit. Arts London, 49 (et var. *melanurus*).

Pimelodus cerulescens, RAF. (1820), Ich. Ohiensis, 63.—KIRTLAND (1838), Rept. Zool. Ohio, 169, 194; (1846), Bost. Journ. Nat. Hist. iv, 332.—STORER (1846), Synopsis Fishes N. A. in Mem. Nat. Acad. Sci. 405. (All these descriptions refer more or less to *Amiurus nigricans*).

Ictalurus cærulescens, GILL (1862), Proc. Bost. Soc. Nat. Hist. 43.—COPE (1865), Proc. Acad. Nat. Sci. Phila. 85; (1870), Proc. Am. Philos. Soc. 489.—JORDAN (1874), Ind. Geol. Survey, 222.—GILL (1876), Ich. Capt. Simpson's Exped. 417.

Ichthælurus cærulescens, COPE (1869), Journ. Acad. Nat. Sci. 237.

Silurus argentinus, RAF. (1820), Quart. Journ. Sci. Lit. Arts London, 50.

Pimelodus argyrus, RAF. (1820), Ichthyologia Ohiensis, 64,

Pimelodus furcifer, CUV. & VAL. (1840), xv, 139.—"HYRTL (1859), Denkschr. Akad. Wiss. Wien, 16".—"KNER, Sitzgsber. Akad. Wiss. Wien, xxvi, 421."

Ictalurus furcifer, GILL (1862), Proc. Bost. Soc. Nat. Hist. 43.—JORDAN (1876), Manual Vert. 300.

Pimelodus gracilis, HOUGH (1852), Fifth Ann. Rept. Reg. Univ. Condition State Cabinet Nat. Hist. Albany, 26.

Synechoglanis gracilis, GILL (1859), Trans. Lyc. Nat. Hist. 3 (reprint).

Ictalurus gracilis, GILL (1862), Proc. Bost. Soc. Nat. Hist. 43.—COPE (1865), Proc. Acad. Nat. Sci. Phila. 85.—JORDAN (1876), Man. Vert. 300.—JORDAN & COPELAND (1876), Check List, 159.

Pimelopus vulpes, GIRARD (1858), Proc. Acad. Nat. Sci. Phila. 170; (1859), U. S. and Mex-Bound. Surv. 33.*

Ictalurus vulpes, GILL (1862), Proc. Bost. Soc. Nat. Hist. 43.—JORDAN & COPELAND (1876), Check List, 159.

Pimelodus olivaceus, GIRARD (1858), Pac. R. R. Survey, x, 211.

Ictalurus olivaceus, GILL (1862), l. c. 43; (1876), Rept. Ichthy. Capt. Simpson's Exp. 417.—JORDAN (1876), Man. Vert. 300.—JORDAN & COPELAND (1876), Check List, 159.

Synechoglanis beadlei, GILL (1859), Trans. Lyc. Nat. Hist. N. Y. 2 (reprint).

Ictalurus beadlei, GILL (1862), Proc. Bost. Soc. Nat. Hist. 43.—JORDAN & COPELAND (1876), Check List, 159.

Pimelodus houghii, GIRARD (1859), Proc. Acad. Nat. Sci. Phila. 159.

Pimelodus megalops, GIRARD (1859), l. c. 161 (said to have the eye very large, its diameter one-third the length of the side of the head).

Ictalurus megalops, JORDAN & COPELAND (1876), Bull. Buff. Soc. Nat. Hist. 159.

Pimelodus graciosus, GIRARD (1859), Proc. Acad. Nat. Sci. Phila. 161.

Pimelodus hammondii, ABBOTT (1860), Proc. Acad. Nat. Sci. Phila. 568.

Pimelodus notatus, ABBOTT (1860), Proc. Acad. Nat. Sci. Phila. 569.

Ictalurus simpsoni, GILL (1862), Proc. Bost. Soc. Nat. Hist. 43; (1876), Ich. Capt. Simpson's Exp. 417.

Habitat.—Northern New York; Canada. Great Lake Region, throughout Mississippi Valley, Nebraska, Kansas, to Georgia, Florida, and Texas.

The synonymy of this species is not altogether creditable to workers in American ichthyology. It is one of our most abundant and widely diffused fishes, and one even less subject to variations than species of such wide distribution usually are. And yet, if the above synonymy is correct, we have twenty-three different specific and varietal names applied to it. It would seem as if every naturalist who had obtained a Channel Cat was sure that such a Cat-fish, so slender, so clean, and so white, must surely be unknown to science, or else he would have heard of it before. As a result of this, nearly every writer on American fresh-water fishes has one or more nominal species based on some

stage in the growth of the *Ichthælurus punctatus*, or on some real or imagined variation of it.

The specific name *cærulescens* has been the one most generally employed, although, as will be seen from the above synonymy, eight different specific and varietal names have priority over it. The oldest description is apparently that of Rafinesque under the name of *Silurus punctatus*. The specific name of *punctatus* is accordingly the one to be employed. The other Rafinesquian names evidently apply to different stages in the growth of the species. Rafinesque's *P. cærulescens*, however, as well as that of Dr. Kirtland and others, includes *Amiurus nigricans*. This error has been the source of much confusion; the great Mississippi Cat-fish having been wrongly supposed to be an *Ichthælurus*. I find nothing in the accounts given of *furcifer* and *caudafurcatus* to indicate that they were founded on species distinct from *punctatus*. *I. gracilis* Hough (=*houghii* Grd.) is said to have a less number of anal rays than has been noticed in *punctatus*. Hough's specimens were from Northern New York. I have examined specimens from Saint Lawrence County, New York, presumably referable to *gracilis*, but they have 27 anal rays, and, so far as I can see, are precisely like the ordinary *punctatus*, except that the serrations of the pectoral spine are perhaps a trifle weaker. An examination of the types of *beadlei*, *simpsoni*, *olivaceus*, and *vulpes* shows nothing of specific value. The number of anal rays is 25 to 28 in them all, as in typical *punctatus*. *Olivaceus* appears rather more slender than is usual. *Notatus* and *hammondi* are rather indifferently described, but there is nothing in the description of either to show that it does not belong here. The types of *graciosus* and *megalops* have a rather longer anal fin than usual, and differ slightly in form. I have seen other specimens like them, but am unable to recognize even a variety. Girard's statement of the size of the eye in *megalops* is exaggerated.

4. ICHTHÆLURUS MERIDIONALIS, (*Günther*) *Jordan*.

Southern Channel Cat.

(Figs. 7 and 8.)

Amiurus meridionalis, GÜNTHER (1864), Cat. Fishes Brit. Mus. v, 102; (1868), Trans. Zool. Soc. London, 473.

I infer, from the figure only, that this species belongs to *Ichthælurus* rather than to *Amiurus*. Although the distinctive characters of the two genera were made known in 1862, in the description of this species we find no allusion to those characters, and no attempt at comparison

of the species with those previously known. So far as I can judge from the figure, this species is an affine of *I. robustus*, having, like that species, the eye anterior and the number of anal rays intermediate (28 or 29), but differing in the greater slenderness of the body.

GENUS AMIURUS, (*Rafinesque*) *Gill.*

Silurus et *Pimelodus* sp., LINNÆUS, and all writers prior to 1862.
Ameiurus, RAFINESQUE (1820), Ich. Obiensis, 65 (as section under subgenus *Ictalurus* of *Pimelodus*).
Amiurus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 50, and of recent writers generally.
Ameiurus, Cope (1864), Proc. Acad. Nat. Sci. Phila. 231.
Gronias, * Cope (1864), Proc. Acad. Nat. Sci. Phila. 231 (*G. nigrilabris*).

ETYMOLOGY.—*a*, privitive; *μειουρος*, curtailed, in allusion to the entire caudal fin.
TYPE.—*Silurus cupreus* Rafinesque.

Body moderately elongated, robust, anteriorly vertically ovate, and scarcely compressed; caudal peduncle also robust, but much compressed, and at its end evenly convex.

Head large, wide, laterally expanded, above ovate and in profile cuneiform; supraoccipital extended little posteriorly and terminating in a more or less acute point, which is entirely separate from the second interspinal buckler; the skin covering the bones is thick.

Eyes rather small, in one species covered by the skin; mouth large, terminal, transverse, the upper jaw in most species the longer; jaws often equal, the lower in one or two species distinctly projecting.

Teeth subulate, aggregated in broad bands on the intermaxillaries and dentaries; the intermaxillary band is convex in front, of equal breadth, and abruptly truncated near the insertion of the intermaxillaries; the lower dental band is anteriorly semicircular, attenuated to the angles of the mouth.

Branchiostegal membrane on each side with eight or nine rays in typical species, ten or eleven in two or three aberrant species; dorsal situated over the interval between the pectorals and ventrals, higher than long, with a pungent spinous ray dentate behind, and about six branched rays; adipose fin short, inserted over the posterior half of the anal; anal fin of moderate length, with from fifteen to twenty-six rays, the usual number being twenty or twenty-one; caudal fin short, usually truncate when spread open, slightly emarginate when not expanded,—in species related to *Ichthælurus* more or less deeply forked, in some other species rounded; when the caudal fin is forked the lobes are usually un-

* Prof. Cope thus defines this genus:—"Head broad, depressed; supraoccipital bone posteriorly free; branchiostegal membrane with ten rays; anterior dorsal spine stout; posterior (adipose) fin separated from caudal; ventrals with eight rays; eyes rudimental, covered by the corium; natatory bladder present."

equal; ventrals each with one simple and seven branched rays; pectoral fins each with a stout spine, which is commonly retrorse-serrate behind; these serræ vary much with age and circumstances, and do not appear in this genus to furnish good specific characters; lateral line usually incomplete.

This genus includes our common Eastern American Catfishes, and is readily recognized by the broad head covered by a thick skin, the free termination of the posterior process of the supraoccipital bone, the compressed body, and by the free adipose fin.

This genus, although undoubtedly a very natural one, is rather hard to define. Certain species (*lupus*, *niveiventris*, *nigricans*) have real affinities with the species of *Ichthælurus*, having, like them, the body elongate, the head rather narrow, the anal long, the caudal forked, and the coloration pale. The absence of the connection between the supraoccipital and the interspinal is the only technical character by which *Amiurus* may be distinguished from *Ichthælurus*.

ANALYSIS OF SPECIES.

*. Caudal fin forked; upper jaw longest; dorsal beginning nearer snout than adipose fin; colors blackish-silvery:

†. Anal fin elongate, of 23 to 28 rays:

a. Caudal fin deeply furcate; head narrow, longer than broad; anal rays 23 or 24; pectoral spines long and slender, dentate; barbels long; depth about 5 in length; width of head $4\frac{3}{4}$; body rather slender:

—. Head narrowed, its width being less than its length above; distance from snout to dorsal spine $1\frac{1}{8}$ to $1\frac{1}{4}$ in distance from dorsal spine to adipose fin; base of anal as long as head ..... LUPUS, 5.

—. Head broader, its width equal to its length above; distance to dorsal spine $1\frac{1}{6}$ in distance from spine to adipose fin; base of anal notably less than head ..... NIVEIVENTRIS, 6.

aa. Caudal fin strongly furcate; head $4\frac{1}{4}$ in length, its width 5; anal rays 25 or 26; pectoral spines dentate, short, and stout; barbels long; body rather stout, color dark, often mottled with pale; size very large ..... NIGRICANS, 7.

aaa. Caudal fin shallow-furcate; pectoral spine not serrate; head broad, as wide as long ..... BOREALIS, 8.

††. Anal fin short and rather low, of 19 to 22 rays; adipose fin very large; humeral process strongly rugose; colors pale, more or less silvery:

b. Head narrower, longer than wide, its width 4 to 6 times in length; mouth narrow; upper jaw much projecting; eye large, 3 to 5 in interorbital width; barbels long, except nasal barbel; lateral line almost complete; caudal fin more deeply forked; anal fin $4\frac{1}{2}$ to 5 in length; dorsal about midway between adipose fin and snout ..... ALBIDUS, 9.

bb. Head very broad, as wide as long, its width $3\frac{3}{4}$ in length of body; eye 5 to 6 in interorbital width; caudal not deeply forked; anal fin $5\frac{1}{2}$ to 6 in length; mouth wider than in any other species; jaws nearly equal; dorsal much nearer adipose fin than snout; colors pale, somewhat silvery, especially on head ..... LOPHIUS, 10.

Caudal fin not forked, rounded or usually somewhat emarginate, nearly truncate when spread open:

Body moderately elongate, depth one-fifth or more of length; branchiostegals normally 9 or 10:

v. Anal fin very long, its base one-fourth or more of length of body, of 24 to 26 rays; dorsal spine normally nearer snout than adipose fin:

—. Head and body elongated; the dorsal region considerably elevated; the head quite long and narrowed forwards; much longer than broad; its width in front of eye only about half its length; mouth rather narrow, with equal jaws; barbels long; adipose fin large; spines strong; dorsal fin very high; anal fin long and deep; caudal fin short; color dark ..... EREBENNUS, 11.

— — Head wide and flattish, not much longer than broad; rounded in front; the mouth very wide; the dorsal region not much elevated; body more or less stout and thick; branchiostegals 8 or 9; jaws equal or upper jaw longest ..... NATALIS, 12.

w. Dorsal considerably nearer snout than adipose fin:

x. Jaws equal; spines very short; anal rays 25; colors yellowish-brown, *Lividus*, b.

xx. Upper jaw distinctly longest:

y. Anal rays 24 or 25, its rays less than half head, its base $3\frac{1}{4}$ in length of body; the nape not swollen:

z. Colors pale; yellowish-brown ..... *Cupreus*, c.

zz. Colors dark; black or greenish ..... *Cœnosus*, d.

yy. Anal rays 26; base of anal $3\frac{1}{2}$ in length, its rays short, less than half length of head; spines weak; head $3\frac{1}{2}$ to $3\frac{3}{4}$ in length; distance to dorsal spine $2\frac{3}{8}$ to $2\frac{3}{4}$; the nape more or less swollen and elevated ..... *Antoniensis*, c.

yyy. Anal rays 27, its base elongate, $3\frac{1}{8}$ in length, its longest rays more than half head; spines strong; head short, 4 in length, the distance to dorsal nearly 3; nape not swollen ..... *Analis*, [illegible].

ww. Dorsal rather nearer adipose fin than snout; the posterior part of the body being much thicker and proportionally shortened; the caudal fin short; dorsal and ventral outlines nearly parallel; jaws about equal ..... *Natalis*, a.

cc. Anal fin moderate, of 19 to 22 rays; branchiostegals normally 8 or 9:

d. Lower jaw distinctly longest; anal rays 20:

e. Body moderately elongate, depth $4\frac{1}{2}$ to 5 in length; head $3\frac{1}{2}$ to 4; barbel long; mouth wide; head longer than broad, rather narrowed forward; profile rather steep, pretty evenly convex; dorsal region more or less elevated; dorsal spine nearer snout than adipose fin; lower jaw strongly projecting; color blackish (varying in subspecies *ælurus* to head blunter and flatter above; dorsal spine rather nearer adipose fin) ..... VULGARIS, 13.

dd. Jaws equal, or upper jaw projecting beyond lower:

f. Eyes distinct, well developed:

g. Head moderately broad, a nearly even slope from the tip of the snout to the elevated base of the dorsal:

—. Body sharply mottled with brown, greenish, and whitish; the coloration therefore singular among Catfishes; jaws equal or nearly so; depth about 4 in length; slope of profile very steep; dorsal fin high; the spine more than half length of head; dorsal spine nearer adipose fin than snout; barbels long; branchiostegals 10; head $3\frac{1}{4}$ in length ..... MARMORATUS, 14.

—. Body nearly uniform in color above, or slightly mottled or clouded:

h. Body rather elongate; depth 4 to 4½ in length; head broader than in the next, the front less steep, but the slope from snout to dorsal more uniform; body less rapidly narrowed behind; anal fin longer; its base 4½ in body, the rays usually 21 or 22; dorsal usually rather nearer adipose fin than snout; the upper jaw more elongate; color dark yellowish-brown, varying to dusky or even to black, sometimes more or less clouded ....CATUS, 15.

hh. Body very short, stout, and deep, the depth 3½ to 4 in length; head moderate, somewhat contracted forward; the front steeply elevated, the body thick across the shoulders, rather rapidly narrowed behind; anal fin short and deep, of 18 to 20 rays, its base nearly 5 in length of body; dorsal nearer adipose fin than snout; jaws nearly equal; size small; color almost black; form varying to extremely short and thick, especially behind, with short caudal fin ..... MELAS, 16.

gg. Head very broad, the slope from snout to base of dorsal quite uneven, there being a more or less decided angle at occiput; head about as broad as long, its length about 4 in body; dorsal spine nearer adipose fin than snout, its rays usually 19 (rarely 18 or 20); body short and stout; mouth very broad; color rather pale, chiefly uniform yellowish-brown, varying to dark brown or pale yellow; head sometimes yellow (*Raf.*); belly yellow; size small .....XANTHOCEPHALUS, 17.

ff. Eyes more or less rudimentary and concealed beneath the skin; jaws equal; muzzle flat; dorsal spine midway between snout and middle of adipose fin; barbels short; caudal slightly emarginate; anal with 18 rays; color blackish above; jaws and fins black; sides varied with yellowish; belly pale; branchiostegals 10 .....NIGRILABRIS, 18.

ccc. Anal fin few-rayed (rays 15 to 17):

i. Upper jaw distinctly longest:

j. Body short and stout; depth about 4 in length; head flattened, nearly as broad as long; dorsal nearer adipose fin than snout; mouth large; spines moderately serrate; colors very dark, almost black .....PULLUS, 19.

jj. Body slender, elongate, the depth about 5½ in length; head roundish, rather long, about 4 in length, the width 4½; mouth small; the upper jaw more projecting than in any other of the species known; profile convex, not steep; dorsal fin very high, ⅔ length of head, well forward, its spine nearer snout than adipose fin; anal fin short and high, its base 5 in length of body; pectoral spine serrated; color pale olive-brown; a blackish horizontal bar at base of dorsal.....BRUNNEUS, 20.

‡‡. Body excessively slender, elongate, as in *Pelodichthys*, the depth being 6 to 8 times in length of body; head broad and flat, nearly as wide as long; anal fin with 20 rays; the base of the fin 4½ to 5 in body; jaws equal; branchiostegals 11; mouth very wide; dorsal spine nearer snout than adipose fin; coloration ordinary, a blackish horizontal bar at base of dorsal,

PLATYCEPHALUS, 21.

5. AMIURUS LUPUS, (*Girard*) *Günther.*

Texas Cat.

(Figs. 9 and 10.)

Pimelodus lupus, GIRARD (1858), U. S. Pac. R. R. Expl. x, 211.
Amiurus lupus, GÜNTHER (1864), Cat. Fishes Brit. Mus. v., 101.

Habitat.—Streams of Texas.

This species strongly resembles *Ichthælurus punctatus*, but differs in the shorter body, wider mouth, and darker colors, as well as in the generic character of the free supraoccipital. In this species, however, there intervenes scarcely more than the diameter of a pin's head between the supraoccipital and the interspinal, in specimens 8 inches long; so nearly connected are they that I was at first disposed to consider this species as an *Ichthælurus*. Numerous specimens of *A. lupus* are in the museum from Texas.

6. AMIURUS NIVEIVENTRIS, *Cope.*

White-bellied Cat.

(Figs. 11 and 12.)

Amiurus niveiventris, COPE (1870), Proc. Am. Philos. Soc. 486; JORDAN & COPELAND (1876), Check List, 159.

Habitat.—Neuse River, North Carolina.

This species seems to be very close to *A. lupus*, but appears to differ in the broader head and in some other features. I have seen no specimens of it.

7. AMIURUS NIGRICANS, (*Le Sueur*) *Gill.*

Great Fork-tailed Cat—Mississippi Cat.—Florida Cat.

(Figs. 13 and 14.)

Pimelodus nigricans, LE SUEUR (1819), Mémoires du Muséum d'Hist. Nat. v, 153.—CUV. & VAL. (1840), xv, 133.—DE KAY (1842), Fishes N. Y. 180.—STORER (1846), Synopsis, 403.—"HYRTL (1859), Denkschrift Akad. Wiss. Wien, xvi, 16."
Amiurus nigricans, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—JORDAN (1876), Man. Vert. 318.—JORDAN & COPELAND (1876), Check List, 159 (not of GÜNTHER (1864) nor of COPE (1870) = *A. cœnosus*).
Silurus (*Pimelodus*) *nigrescens*, RICHARDSON (1836), Fauna Bor.-Am. Fishes, 134.
Pimelodus sp. incog., THOMPSON (1842), History Vermont, 139.
Pimelodus coerulescens, in part of RAFINESQUE, KIRKLAND, and others; the big "Channel Cats" all belong to this species.

Habitat.—Great Lakes and Mississippi River, ascending all the larger tributaries, larger rivers of the South Atlantic and Gulf States generally.

This species is the "Great Fork-tailed Cat" of the Lakes and the "Great Mississippi Cat" of the Mississippi and Ohio Rivers. I have seen and identified specimens of thirty to forty pounds weight, and have seen specimens which I suppose were of this species which weighed nearly a hundred pounds. I have heard of Catfish weighing two or three hundred pounds, but have never seen them, and presume they were "weighed by guess". This species undoubtedly attains the largest size of any of our representatives of the family. Specimens of this species of a large size are in the United States National Museum, from St. John's River, Florida. They appear to have a rather steeper front than the northern ones, but are otherwise similar.

As indicated above, the "*A. nigricans*" of Dr. Günther is probably the *cœnosus*, as the present species has the caudal fin strongly forked.

8. AMIURUS BOREALIS, (*Richardson*) *Gill.*

The Mathemeg *or* Land Cod.

Pimelodus borealis, RICHARDSON (1836), Fauna Boreali-Americana, Fishes, 135.—CUV. & VAL. (1840), xv, 130.—STORER (1846), Synopsis, 402.

Amiurus borealis, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—GÜNTHER (1864), Cat. Fishes, v, 100.—COPE (1870), Proc. Am. Philos. Soc. 485.—JORDAN & COPELAND, Check List, 159.

Habitat.—British America.

I do not know this species, and it may not really have a forked caudal fin. It is not improbable that its relations are with *Amiurus cœnosus* rather than with *A. nigricans*.

9. AMIURUS ALBIDUS, (*Le Sueur*) *Gill.*

Eastern Fork-tailed Cat—"Channel Cat" of the Potomac.

(Figs. 15 and 16.)

Pimelodus albidus, LE SUEUR (1819), Mém. du Mus. d'Histoire Nat. v, 148.—CUV. & VAL. (1840), xv, 131.

Amiurus albidus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.

Pimelodus nebulosus, CUV. & VAL. (1840), xv, 132 (in part; not of Le Sueur).

Amiurus nebulosus, GÜNTHER (1864), Cat. Fishes, v, 101.

Pimelodus lynx, GIRARD (1859), Proc. Acad. Nat. Sci. Phila. 160.

Amiurus lynx, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—COPE (1870), Proc. Am. Philos. Soc. 485.—UHLER & LUGGER (1876), Fishes Maryland, 152.—JORDAN (1876), Man. Vert. 300.—JORDAN & COPELAND (1876), Check List, 160.

Ictalurus macaskeyi, STAUFFER (1869), Mombert's History Lancaster Co. Pa. 578.

Ictalurus kevinskii, STAUFFER (1869), Mombert's History Lancaster Co. Pa. 578.

Habitat.—Atlantic streams, Pennsylvania to North Carolina.

The *Pimelodus albidus* of Le Sueur* seems to me rather to have been

* Le Sueur says: "Tête large, aplatie; * * couleur d'un blanc cendrée * * * caudale très légèrement echancrée," characters evidently belonging to the *lynx* rather than to the *catus*. This is the more plain, as in describing the distinctly fork-tailed

based on this species than on an albino of *catus*, as supposed by Prof. Cope. I have therefore substituted the appropriate name *albidus* for the unmeaning *lynx*. This is an extremely variable species. Old specimens bear a strong resemblance to the next species, while the young are quite slender.

10. AMIURUS LOPHIUS, *Cope.*

Big-mouthed Cat.

(Figs. 17 and 18.)

Amiurus lophius, COPE (1870), Proc. Am. Philos. Soc. 486.—JORDAN (1876), Manual Vert. 301.—JORDAN & COPELAND (1876), Check List, 160.

Habitat.—Streams tributary to Chesapeake Bay. *A. lophius* is a common fish in the Washington markets.

The synonymy of this species requires no special remark.

11. AMIURUS EREBENNUS, (*Jordan*) sp. nov.

Goode's Cat.

(Figs. 19 and 20.)

Habitat.—St. John's River, Florida.

This species is related to *A. nigricans* and others of the fork-tailed group, but has the truncate caudal fin of *A. lividus*.

Body rather elongate, compressed, the depth about 4⅓ in length; dorsal region rather elevated, the head quite long and narrowed forward, 4 times in length of body. The head is more narrowed than in any of the other species except *A. lupus*. The width of the head in front of the eye is but little more than half its length. The width of the mouth is about half the length of the head. The greatest width of the head is contained about 1⅓ times in its length. The dorsal fin is slightly nearer the snout than the adipose fin.

The dorsal fin is unusually high, its spine is long, as in the species of *Ictalurus*. The pectoral spine is very strong and it is about half as long as the head. The anal fin is long and deep. It is nearly one-fourth the length of the body, and is composed of 24 rays. The adipose fin is large. The caudal fin is rather short and is truncate behind.

The jaws are equal. The supraoccipital bone is but little free behind. The branchial apertures are rather more restricted than usual.

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nigricans, Le Sueur says, "caudale légèrement echancrée en croissant." It seems that Prof. Gill had some time since independently reached a similar conclusion, and that the "*Amiurus lynx*" has been for some time correctly known as *A. albidus* by the members of the Fish Commission.

Color very dark. The type-specimen is quite black, both body and fins; the belly is pale, but the lower barbels as well as the upper ones are black.

The type was collected in the St. John's River, Florida, by Mr. G. Brown Goode. It is a little more than a foot long.

This species is intermediate between *A. lupus* and *A. lividus*, having the narrowed head, high dorsal, and small mouth of the first, with the short, truncate candal fin of the second.

12. AMIURUS NATALIS, (*Le Sueur*) *Gill.*

Catfish—Yellow Cat.

a. Subspecies NATALIS.

(Figs. 21 and 22.)

Pimelodus natalis, LE SUEUR (1819), Mém. du Muséum, v, 154—STORER (1846), Synopsis, 405.

Amiurus natalis, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44—GÜNTHER (1864), Cat. Fishes Brit. Mus. v, 101.

Pimelodus puma, GIRARD (1859), Proc. Acad. Nat. Sci. Phila. 160.

Habitat.—Great Lakes to North Carolina and south.

b. Subspecies LIVIDUS, *Raf.*

(Figs. 23 and 24.)

Silurus lividus, RAFINESQUE (1820), Quart. Journ. Sci. Lit. Arts, London, 48 (et var. *fuscatus*).

Pimelodus lividus, RAFINESQUE (1820), Ich. Ohiensis, 65.

Amiurus lividus, JORDAN (1876), Man. Vert. 302.—JORDAN & COPELAND (1876), Check List, 159.

Pimelodus felinus, GIRARD (1858), U. S. Pac. R. R. Expl. x, 209.

Amiurus felinus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—COPE (1870), Proc. Am. Philos. Soc. 485.—JORDAN & COPELAND (1876), Check List, 159.

Pimelodus catus, GRD. (1859), Proc. Phila. Acad. Nat. Sci. 160 (not of De Kay and most authors).

Amiurus catus, COPE (1870), Proc. Am. Philos. Soc. 484.—JORDAN & COPELAND, Check List, 159.

Pimelodus cupreoides, GIRARD (1859), Proc. Acad. Nat. Sci. Phila. 159.

Amiurus cupreoides, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.

Habitat.—Ohio Valley to Arkansas. North Carolina and south.

c. Subspecies CŒNOSUS, (*Richardson*) *Gill.*

(Figs. 25 and 26.)

Silurus (*Pimelodus*) *cœnosus*, RICHARDSON (1836), Fauna Bor.-Amer. Fishes, 132.—CUV. & VAL. (1840), xv, 129.—DE KAY (1842), Fishes N. Y. 186.—STORER (1846), Synopsis, 402.

Amiurus cœnosus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—COPE (1870), l. c. 485.—JORDAN (1876), Man. Vert. 303.—JORDAN & COPELAND, Check List, 159.

Habitat.—Maine to Great Lakes and northward.

d. Subspecies CUPREUS, (*Raf.*) *Gill.*

(Figs. 27 and 28.)

Silurus cupreus, RAF. (1820), Quart. Journ. Sci. Lit. Arts, London, 51.
Pimelodus (*Ameiurus*) *cupreus*, RAFINESQUE (1820), Ich. Oh. 65.
Pimelodus cupreus, KIRTLAND (1838), Rept. Zoöl. Ohio, 169, 194; (1846), Bost. Journ. Nat. Hist. iv, 333.—DE KAY (1842), Fishes N. Y. 187.—STORER (1846), Synopsis, 404.—GIRARD (1859), Proc Acad. Nat. Sci. Phila. 159.
Amiurus cupreus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—COPE (1870), Proc. Am. Phil. Soc. 485.—JORDAN (1876), Bull. Buff. Soc. Nat. Hist. 96; (1876), Man. Vert. 303.—NELSON (1876), Bull. Ills. Mus. Nat. Hist. 50.—JORDAN & COPELAND (1876), Check List, 159.—NELSON (1876), Bull. Ills. Mus. Nat. Hist. 50.—JORDAN (1877), Annals Lyceum Nat. Hist. N. Y. —.—JORDAN (1877), Proc. Acad. Nat. Sci. Phila. 45.
Ameïrus cupreus, COPE (1865), Proc. Acad. Nat. Sci. Phila. 276.

Habitat.—Ohio Valley, Mississippi Valley, and south.

e. Subspecies ANTONIENSIS, (*Grd.*) *Gill.*

(Figs. 29 and 30.)

Pimelodus antoniensis, GIRARD (1859), Pac. R. R. Expl. x, 291.
Amiurus antoniensis, GILL (1862), l. c. 44.—COPE (1870), l. c. 485.

Habitat.—Georgia to Texas.

f. Subspecies ANALIS, *Jordan.*

(Figs. 31 and 32.)

Habitat.—Arkansas River.

I have hitherto followed Girard in identifying this species with *Silurus catus* of Linnæus, but a glance at the original description is sufficient to show the error of such an identification. The first name in order of time which seems to have been given to this species is that of *Pimelodus natalis* Le Sueur, but the best of the early descriptions is that of Rafinesque as *Pimelodus lividus*.

The original description of *cupreus* is incorrect in ascribing 15 anal rays instead of 25. This is probably a misprint. The form or subspecies here indicated as *cupreus* is the one most widely diffused. The type of Girard's *catus* differs only from specimens labelled (by him ?) *cupreus* in having the jaws equal. The form called *cœnosus* seems to differ chiefly in coloration; this species, like most others, being of a much darker color in the Northern Lakes.

A. antoniensis Grd. is also slightly different in form. The specimens obtained by me in the Etowah River, Georgia, I refer to *antoniensis*. They are short in body, with a swollen nape and a rather longer anal fin.

Specimens from Little Red River, Arkansas, collected by Prof. H. S.

Reynolds, with an extremely long anal fin and some peculiarities of form, I have termed var. *analis*.

The description of *Pimelodus natalis* Le Sueur appears to have been based on an individual with the caudal peduncle swollen and elevated.

It appears that most of the species have what may be termed "*natalis*" forms, *i. e.*, individuals with the post dorsal region shortened and thickened, with the adipose fin enlarged, and with the caudal fin very short; owing to the encroachment of the flesh on its rays. These forms often appear more distinct from the normal type than do any two allied species. The names *puma* and *natalis* seem to have been based on the *natalis* type of this species. *Catulus* and *confinis* are the *natalis* form of *melas*, and so on. Whether these peculiar forms are distinct races or aberrant individuals, or stages in the life of an individual, or what they are, I have not now sufficient evidence to enable me to decide. I can only say that I do not at present consider them distinct *species*.

13. AMIURUS VULGARIS, (*Thompson*) *Nelson*.

Long-jawed Catfish.

a. Subspecies VULGARIS.

(Figs. 33 and 34.)

Pimelodus vulgaris, THOMPSON (1842), History of Vermont 138.
Amiurus vulgaris, NELSON (1876), Bull. Ills. Mus. Nat. Hist. 50.—JORDAN & COPELAND (1876), Check List, 159.
Pimelodus dekayi, GIRARD (1859), Proc. Acad. Nat. Sci. Phila. 160.
Amiurus dekayi, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—COPE (1870), Proc. Am. Philos. Soc. 485.—JORDAN (1876), Man. Vert. 302.

Habitat.—Lake Champlain and Great Lake region.

b. Subspecies ÆLURUS, (*Girard*) *Gill*.

(Fig. 35.)

Pimelodus ailurus, GIRARD (1858), U. S. Pac. R. R. Surv. Fishes, 210.
Amiurus ailurus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.
Amiurus ælurus, COPE (1870), Proc. Am. Philos. Soc. 485.—JORDAN (1876), Man. Vert. 302.—JORDAN & COPELAND (1877), Check List, 159.

Habitat.—Upper Mississippi River, Missouri River and their tributaries, also in Red River of the North.

Girard's statement that his *dekayi* is the same as De Kay's *Pimelodus catus* is certainly incorrect, if any reliance is to be placed on descriptions. That Thompson's *vulgaris* is the same as *dekayi* I have no doubt. *Amiurus ælurus*, of which I have examined the types as well as numer-

ous specimens from the Red River of the North, from the Mississippi River at Saint Louis, and from the Illinois River, differs somewhat in proportions; but I think it specifically identical with *A. vulgaris* from Lake Erie.

14. AMIURUS MARMORATUS, (*Holbrook*) *Jordan.*

Marbled Catfish.

(Figs. 36 and 37.)

Pimelodus marmoratus, HOLBROOK (1855), Journ. Acad. Nat. Sci. Phila. 54.

Habitat.—Georgia to Florida.

This beautiful and singular species seems to have been overlooked by all writers since the original description. The characters given in the preceding analysis are taken from a specimen sent by Dr. Holbrook to the United States National Museum. It differs from *catus* chiefly in the coloration. I have been informed that similarly colored Catfishes occur in Pennsylvania, and I have seen a crayon sketch of one such by Mr. J. H. Richard.

15. AMIURUS MELAS, (*Rafinesque*) *Jordan & Copeland.*

Small Black Catfish.

(Figs 38 and 39.)

Silurus melas, RAFINESQUE (1820), Quart. Journ. Sci. Lit. Arts, London, 51.
Pimelodus melas, RAFINESQUE (1820), Ichthyologia Ohiensis, 66.
Amiurus melas, JORDAN & COPELAND (1876), Check List, 159.
Pimelodus catulus, GIRARD (1858), U. S. Pac. R. R. Surv. 208.
Amiurus catulus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—COPE (1870), Proc. Am. Philos. Soc. 485.—JORDAN & COPELAND (1876), Check List, 159.
Pimelodus confinis, GIRARD (1859), Proc. Acad. Nat. Sci. Phila. 159.
Amiurus confinis, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—COPE (1870), Proc. Am. Philos. Soc. 486.—JORDAN (1876), Man. Vert. 301.—NELSON (1876), Bull. Ills. Mus. Nat. Hist. 50.—JORDAN & COPELAND (1876), Check List, 159.
Amiurus obesus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 45.—JORDAN & COPELAND (1876), Check List, 159.—GILL (1876), Ich. Capt. Simpson's Explorations, 420.
Amiurus nebulosus, COPE & YARROW (1876), Zoöl. Lieut. Wheeler's Surv. West of 100th Meridian, v, 640 (excl. syn.).
Amiurus pullus, NELSON (1876), Bull. Ills. Mus. Nat. Hist. 50 (not *P. pullus* De K.).

This species occurs abundantly throughout the Mississippi Valley, replacing the allied species *catus*. Prof. Cope considers it a variety of *catus;* but the short deep body and small anal fin thus far have served to distinguish it. The coloration of the anal fin is somewhat characteristic. The membrane is unusually black and contrasts with the pale rays.

Girard's types of *confinis* and *catulus* appear to be the shortened or

natalis form of this species. There is certainly nothing in the emargination of the caudal fin in which *confinis* and *hoyi* differ from the rest of the species with the caudal fin truncate, as has been supposed by Prof. Cope, on the strength of Girard's description.

The only good description of this species is that of Prof. Gill, under the name of *Amiurus obesus*, in the report of Captain Simpson's Explorations. I have no doubt of the identity of Rafinesque's *melas* with the *obesus*. The *obesus* occurs in considerable abundance about the Falls of the Ohio, and Rafinesque's description is reasonably accurate.

16. AMIURUS CATUS, (*L.*) *Gill.*

Bullhead—Hornpout—Catfish.

(Figs. 40 and 41.)

?Bagre fecunda species Marcgr. affinis, CATESBY (1750), Fishes etc. Carolina, 23, tab. xxiii (a most wretched figure, absolutely unidentifiable).

Silurus catus, LINN. (1758), Syst. Nat. x, p. 305; (1766), xii, p. 504.—BLOCH. SCHN. (1801), 387.—MITCHILL (1818), Journal Lit. & Philos. Soc. N. Y. i, 433.

Pimelodus catus, CUV. & VAL. (1840), xv, 124.—DE KAY (1842), Fishes N. Y. 182.—STORER (1846), Synopsis, 402.

Amiurus catus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—GÜNTHER (1864), Cat. Fishes, v, 99 (excl. syn. pars).—UHLER & LUGGER (1876), Fishes of Maryland, 152.

Pimelodus nebulosus, LE SUEUR (1819), Mém. de Muséum, v, 149.—STORER (1838), Rept. Fishes Mass. 102.

Amiurus nebulosus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—COPE (1870), Proc. Am. Philos. Soc. 485.

Pimelodus atrarius, DE KAY (1842), Fishes N. Y. 185.—STORER (1846), Synopsis, 404; (1855), Fishes of Mass. 279.

Amiurus atrarius, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—JORDAN (1876), Man. Vert. 30.—NELSON (1876), Bull. Ills. Mus. Nat. Hist. 50.—JORDAN & COPELAND (1876), Check List, 159.—JORDAN (1877), Proc. Acad. Nat. Sci. Phila. 46.

Pimelodus felis, AGASSIZ (1850), Lake Superior, 281.

Amiurus felis, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.

Pimelodus hoyi, GIRARD (1859), Proc. Acad. Nat. Sci. Phila. 159.

Amiurus hoyi, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—COPE (1870), Proc. Am. Philos. Soc. 486.—JORDAN (1876), Man. Vert. 301.—JORDAN & COPELAND (1876), Check List, 159.

Pimelodus vulpeculus, GIRARD (1859), Proc. Acad. Nat. Sci. Phila. 160.

Amiurus vulpeculus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.

Variety? MISPILLIENSIS.

Amiurus mispilliensis, COPE (1870), Proc. Am. Philos. Soc. 486.—JORDAN & COPELAND (1876), Check List, 159.

Habitat.—Great Lake Region and Upper Mississippi to Arkansas and northward; also in streams of the Atlantic States from Maine south to Carolina.

I have restored the name of *catus** to this species, following in this respect Valenciennes and the older American authors rather than Girard, who transferred the name to an entirely different species. The fact that Linnæus counted twenty anal rays renders it unlikely that he had a specimen of *lividus*, a species with twenty-five anal rays before him. As it is not possible to say with certainty what species he did have, we must adopt Valenciennes's identification of it until it is shown that it is probably erroneous. The following is Linnæus's description (Systema Naturæ, xii, 504):—

Catus 12. S. pinna dorsali postica adiposa, ani radiis 20. Cirris 8. B. 5, D $\frac{1}{6}$, O. P $\frac{1}{15}$ V. 8, A. 20. C. 17.

Catesb. car. 2. *p.* 23. *t.* 23. Bagre 2. Maregr. affinis.

Maregr. bras. 173. Bagre species, 2.

Habitat in America, Asia.

Ex—Asia vidi pinnis ventr. radiis 6.

The species termed *atrarius*, *nebulosus*, and *catus* by the earlier authors are evidently identical.

There is nothing in the long description of *Pimelodus felis* to indicate that it is distinct from the common Lake Bullhead. In the elaborate enumeration of characters, individual and generic, given by Prof. Agassiz, nearly all that is specific seems to be lost.

On examination of the type-specimens of *Pimelodus hoyi* Grd., and *P. vulpeculus*, Girard, I am unable to see that they differ at all from this species. The caudal fin is not more emarginate than is usual in *catus*.

Amiurus mispilliensis Cope appears to differ in some respects; but these are probably individual peculiarities, as but one specimen seems to be known.

The best figure of this species is that given by Dr. Storer under the name of *Pimelodus atrarius*.

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*In the twelfth edition of the Systema Naturæ (p. 503), Linnæus describes a *Silurus felis*, which has been considered a species of *Amiurus*. An examination of Linnæus's description has satisfied Prof. Gill and myself that *S. felis* was most probably based on *Arius milberti* C. & V. This latter species should then stand as *Ariopsis felis* (L.) Gill & Jordan.

The following is the original description:

Felis. 10. S. pinna dorsali postica adiposa, ani radis 23 cirris 6, cauda bifida. B. 5, D $\frac{1}{4}$, 0. P. $\frac{1}{11}$ V. 6, A. 23, C. 31.

Habitat in Carolina. *D. Garden.*

Cirri *sub labio inferiore* 4, *supra sinus oris utrinque* 1. Dorsum *cærulescens*. P. ventrales analisque *rubescentes*. Cauda *bifida*. *Affinis S. Cato.*

17. AMIURUS XANTHOCEPHALUS, (*Rafinesque*) *Gill.*

Small Yellow Catfish.

(Figs. 42 and 43.)

Silurus xanthocephalus, RAF. (1820), Quart. Journ. Sci. Lit. Arts, London, 51.
Pimelodus xanthocephalus, RAF. (1820), Ich. Ohiensis, 66.—KIRTLAND (1838), Rept. Zoöl. Ohio, 169, 194.—STORER (1846), Synopsis, 405.
Amiurus xanthocephalus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—JORDAN & COPELAND (1876), Check List, 159.—JORDAN (1877), Ann. Lyc. Nat. Hist. N.Y. —.
Pimelodus catus, KIRTLAND Bost. Journ. Nat. Hist. v. 330. (excl. syn.).
Amiurus albidus, JORDAN (1876), Man. Vert. 302 (not *Pimelodus albidus* Le Sueur).—NELSON (1876), Bull. Ills. Mus. Nat. Hist. 50.
Amiurus nebulosus, JORDAN (1877), Proc. Acad. Nat. Sci. Phila. 45.

Habitat.—Ohio Valley.

Rafinesque's description of this species is rather indifferent. Later writers seem to have overlooked the species altogether, or to have confounded it with *A. catus*. It is certainly quite distinct from *A. catus*, and apparently from all the others here mentioned. The peculiar profile, wide head, as well as the short and small anal fin, are characteristic. These points are fairly shown in Dr. Kirtland's otherwise bad figure of his *Pimelodus catus*.

18. AMIURUS NIGRILABRIS, (*Cope*) *Gill & Jordan.*

Blind Catfish.

(Figs. 44 and 45.)

Gronias nigrilabris, COPE (1864), Proc. Acad. Nat. Sci. Phila. 231.—JORDAN (1876), Man. Vert. 304.—JORDAN & COPELAND (1876), Check List, 160.
Amiurus nigrilabris, GILL, MSS.

Habitat.—Cave streams tributary to the Conestoga River in Eastern Pennsylvania.

The concealed condition of the eyes in this species is not considered by Prof. Gill as a character of sufficient importance to warrant its generic separation.

A. nigrilabris is apparently descended from *A. pullus* or some similar species, its eyes being modified by its subterranean life.

19. AMIURUS PULLUS, (*De Kay*) *Gill.*

Black Bullhead of New York.

(Figs. 46 and 47.)

Pimelodus pullus, DE KAY (1842), Fishes N. Y. 184.—STORER, Synopsis (1846), 404.
Amiurus pullus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—COPE (1870), Proc. Am. Philos. Soc. 485.—JORDAN (1876), Man. Vert. 301.—JORDAN & COPELAND (1876), Check List, 159.

Habitat.—Western New York to Northern New England.

This species resembles *A. catus*, but is distinguishable by the short anal fin. From *A. melas* the broader head and some other peculiarities separate it. It is possible, however, that it is a variety of the latter species.

20. AMIURUS BRUNNEUS, *Jordan.*

Small Brown Cat.

(Figs. 48 and 49.)

Amiurus brunneus, JORDAN (1876), Annals Lyc. Nat. His. N. Y. —.

Habitat.—Ocmulgee River, Georgia.

This species is one of the most strongly marked of the genus. It bears some resemblance to the species of *Noturus*.

21. AMIURUS PLATYCEPHALUS, (*Girard*) *Gill.*

Flat-headed Cat.

(Figs. 50 and 51.)

Pimelodus platycephalus, GIRARD (1859), Proc. Acad. Nat. Sci. Phila. 161.
Amiurus platycephalus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 44.—COPE (1870), Proc. Am. Phil. Soc. 485.—JORDAN & COPELAND (1876), Check List, 159.

Habitat.—North Carolina to Georgia.

This species has the form of *Pelodichthys*, as well as the increased number of branchiostegals. The dorsal spine is, however, well developed, and the anal fin has the usual number of rays, although only 17 were counted by Prof. Cope. The lower jaw does not project, and the dentition is of the pattern usual in *Amiurus*.

GENUS PELODICHTHYS, (*Rafinesque*) *Gill & Jordan.*

Glanis, RAFINESQUE (1818), Am. Monthly Mag. & Crit. Review, 447 (named but not characterized).
Pilodictis, RAFINESQUE (1819), Prodrome de Soixante-dix Nouv. Genres &c. in Journal de Physique de Chymie et d'Histoire Naturelle Paris, 422.

Leptops, RAFINESQUE (1820), Ichthyologia Ohiensis, 64.
Opladelus, RAFINESQUE (1820), Ichthyologia Ohiensis, 64.
Ilictis, RAFINESQUE (1820), Ichthyologia Ohiensis, 66.
Pylodictis, RAFINESQUE (1820), Ichthyologia Ohiensis, 67.
Hopladelus, GILL (1862), Proc. Bost. Soc. Nat. Hist. 45, and of most late authors.
Pelodichthys, GILL & JORDAN, MSS.—JORDAN (1876), Ann. Lyc. Nat. Hist. N. Y. —.
Pimelodus sp., KIRTLAND, CUV. & VAL. et Auct.

ETYMOLOGY.—πηλος, mud; ιχθυς, fish.
TYPE.—*Pilodictis limosus* Raf. = *Silurus olivaris* Raf.

Body much elongated, very slender, much depressed, anteriorly broader than high. Head large, very wide and depressed, latterly expanded, above broadly ovate, and in profile cuneiform. Skin very thick, entirely concealing the skull. Supraoccipital bone entirely free from the head of the second interspinal. Eyes small. Mouth very large, anterior and transverse. The lower jaw always projects beyond the upper. Teeth in broad villiform bands on the intermaxillaries and dentaries. The intermaxillary band is convex anteriorly, and proceeds to the insertion of the maxillaries, where it is abruptly angularly deflected, and proceeds backward as an elongated triangular extension. The band at the symphysis is slightly divided and anteriorly separated by a small triangular extension of the labial membrane. The lower dental is anteriorly semicircular and attenuated to the corners of the mouth. There are about twelve branchiostegal rays on each side.

The dorsal fin is situated over the posterior half of the interval between the pectorals and ventrals, and has a spine and about seven branched rays. The spine is rather small, and more or less enveloped in the thick skin.

The adipose fin is large, and has an elongated base resting over the posterior half of the anal; it is very obese and inclines rapidly backward; it is rather less free posteriorly than in *Amiurus*.

The anal fin is small; it commences far behind the anus, is a little longer than high, and is composed of about thirteen rays.

The caudal fin is oblong, subtruncated, placed on a vertical basis, and with numerous accessory simple rays, recurrent above and beneath the caudal peduncle.

The pectorals have a broad, compressed spine, serrated or dentated on its external and internal margins, and with the prolonged fleshy integument obliquely striated.

The ventrals are rounded and have nine rays, one simple and eight branched.

The anus is situated behind the ventrals, some distance behind their bases, and much in advance of the anal fin.

Coloration: brown or yellowish, more or less marbled or spotted.

The genus *Pelodichthys* is at first sight recognized by the long body, flat in front; the depressed and broad oblong head with the projecting lower jaw, by the posterior extension of the upper bands of teeth, by the partly concealed dorsal spine, the small size of the anal fin, and the recurrence of the caudal fin. But one species is definitely known. The various nominal species described by Rafinesque and Valenciennes, I think, were all based on the common *olivaris*.

Those who hold that the mere naming of a genus, without explanation or attempt at characterization, gives validity to such name, will call this genus *Glanis* instead of *Pelodichthys*.

ANALYSIS OF SPECIES.

*Body very long, slender, depressed forwards, closely compressed behind, the head extremely flat, the lower jaw longest; barbel short; dorsal spine small, half the height of the fin, enveloped in thick skin; pectoral spine very strong, flattened, serrate behind; caudal somewhat emarginate; anal short, its base about 7 in body, of 12 to 15 rays; premaxillary band of teeth with a large distinct backward process on each side; coloration mottled brown and yellowish, whitish below; size large,

OLIVARIS, 22.

22. PELODICHTHYS OLIVARIS, (*Rafinesque*) *Gill & Jordan.*

Mud Catfish.

(Figs. 52 and 53.)

Silurus olivaris, RAFINESQUE (1818), Am. Monthly Mag. iii, Sept. 355.

Hopladelus olivaris, GILL (1862), Proc. Bost. Soc. Nat. Hist. 45.—COPE (1869), Journ. Acad. Nat. Sci. Phila. 237.—JORDAN (1876), Man. Vert. 303.—NELSON (1876), Bull. Ills. Mus. Nat. Hist. 50.—GILL (1876), Ich. Capt. Simpson's Expl. 426.—JORDAN & COPELAND (1876), Check List, 160.—JORDAN (1877), Proc. Acad. Nat. Sci. Phila. 46.

Pelodichthys olivaris, JORDAN (1877), Ann. Lyc. Nat. Hist. N. Y. —.

Glanis limosus, RAF. (1818), Am. Monthly Mag. iii, 447, and iv, 107 (name only).

Pilodictis limosus, RAF. (1819), Journal de Physique, 422.

Pylodictis limosus, RAF. (1820), Ich. Ohiensis, 67.

Silurus nebulosus, RAF. (1820), Quart. Journ. Sci. Lit. Arts, London, 50.

Pimelodus nebulosus, RAF. (1820), Ich. Oh. 64.

Silurus viscosus, RAF. (1820), Quart. Journ. Sci. Lit. Arts, 50.

Pimelodus viscosus, RAF. (1820), Ich. Oh. 66.

Silurus limosus, RAF. (1820), Quart. Journ. Sci. Lit. Arts, 51.

Pimelodus limosus, RAF. (1820), Ich. Oh. 67.—KIRTLAND (1846), Bost. Journ. Nat. Hist. iv, 335.—STORER (1846), Synopsis, 404.

Pimelodus punctulatus, CUV. & VAL. (1840), xv, 134.—DE KAY (1842), Fishes N. Y. 187.—STORER (1846), Synopsis, 403.—GÜNTHER (1864), Cat. Fishes, v, —.

Pimelodus æneus, CUV. & VAL. (1840), xv, 135.—DE KAY (1842), l. c.—STORER (1846), l. c. 403.

Habitat.—Ohio Valley to Iowa and South.

GENUS NOTURUS, *Rafinesque.*

Noturus, RAF. (1818), Am. Monthly Mag. and Crit. Rev. iv, Nov. 41, and of most subsequent authors.

Schilbeodes, BLEEKER (1858), "Ichthyologiæ Archipelagi Indici Prodromus, vol. i. Siluri (Acta Societarum Indo-Nederlandicæ, vol. iv.) 258. (*S. gyrinus* Mit.)." (Also written *Schilbeoides;* I do not know which is the original orthography.)

ETYMLOOGY.—*νωτος*, back; *ουρα*, tail ("means tail over the back", *Raf.*).

TYPE.—*Noturus flavus* Raf.

Body more or less elongate, anteriorly subcylindrical, thence more or less compressed.

Head above ovate and depressed, with a slight longitudinal furrow, branching into a transverse depression on the nape. Skin very thick, entirely concealing the bones. Supraoccipital entirely free from the head of the second interspinal. Eyes small or of moderate size. Mouth anterior, rather large, and transverse. Upper jaw usually more or less projecting beyond the lower. Teeth subulate, closely aggregated in a broad band in each jaw, which in the lower one is interrupted by a linear interval and in the upper one is continuous. The band in the upper jaw is either abruptly truncated at each end (subgenus *Schilbeodes*) or prolonged backward by a continuation from the postero-external angle (subgenus *Noturus*). The lower band is, as usual, attenuated toward the corners of the mouth. Branchiostegal membrane with nine rays on each side.

Dorsal fin situated over the posterior half of the interval between the pectoral and ventral fins, with a very pungent, short, edentulous spine and seven branched rays.

Adipose fin long and low, connected with the accessory rays of the caudal fin, and not forming a separate fin, never free behind; the membrane sometimes high and continuous, sometimes notched, in one species to the base.

Caudal fin very obliquely truncated or rounded, and inserted on an equally obliquely rounded base. The rays rapidly decrease in length inferiorly, and there are numerous rudimentary ones both above the caudal peduncle, where the anterior is united to the adipose fin, and forms a continuous keel (interrupted in one species), and below, where they advance considerably forward.

The anal fin is comparatively short, and rapidly increases in height for the first half of its length. It has from 12 to 20 rays.

The ventrals are rounded, and each has one simple and eight branched rays.

Pectoral fins with a sharp spine, either smooth, grooved, or dentate behind, the size and armature of the spine affording good specific characters.

The anus is situated some distance in advance of the anal fin.

The lateral line is complete.

The *Noturi* may be known at once by the peculiarities of the adipose and caudal fins. The genus is rather less homogeneous than any of the others.

Two subgeneric sections are recognizable:—

Noturus.—Size large; intermaxillary band of teeth with a backward process; pectoral spine nearly smooth within, sharply retrorse-serrate externally; a keel between dorsal and adipose fins.

Schilbeodes.—Size moderate or small; intermaxillary band of teeth without backward process; pectoral spine more nearly smooth externally, grooved or else serrate within; back not distinctly keeled.

ANALYSIS OF SPECIES.

*. Premaxillary band of teeth with a strong backward process on each side (*Noturus*):

a. Body elongate; head depressed, broad, and flat, nearly as broad as long; middle region of body subcylindrical; tail compressed; head about 4¼ in length; width of head 5⅛; depth 5⅜ in length; distance to dorsal about 3 in length; barbels, short; a strong keel on back behind dorsal, leading to adipose fin; adipose fin deeply notched; dorsal spine very short, pectoral spine retrorsely serrate in front, slightly rough or nearly entire behind; its length three times in distance from snout to dorsal; anal rays about 16; color nearly uniform yellowish-brown, in northern specimens blackish above, slightly mottled; fins yellow-edged; size very large, reaches a length of more than a foot FLAVUS, 23.

**. Premaxillary band of teeth without lateral backward processes (*Schilbeodes*):

†. Pectoral spine dentate-serrate behind, more or less roughened in front; adipose fin notched:

b. Pectoral spines shortish, nearly straight, about one-third length of head; the serratures weak, less than half the diameter of the spine; body elongated its depth 5½ to 7 in length; the head very much depressed; anal 14 to 17; colors nearly uniform, somewhat mottled; fins more or less dark-edged.

c. Pectoral spine retrorse-serrate without, weakly serrate within; head very broad, flat, and thin; upper jaw projecting; head about 4¼ in length, depth 6; dorsal fin one-fourth higher than long; distance from snout to dorsal about 2¾ in length; length of pectoral spine 2¾ in same distance; dorsal much nearer anal than snout; anal rays 16 to 20; size large (reaches the length of nearly a foot); colors rather dark; dorsal and caudal fins black-margined..... INSIGNIS, 24.

cc. Pectoral spine slightly retrorse-serrate without, with about six small straigh teeth within, which are not one-third the diameter of the spine in length; head small, not very broad, but thin and depressed; its width 5½ to 6 in length of body; jaws nearly equal; head 4¼ in length, depth 5⅞ to 6½; dorsal scarcely higher than long; distance from snout to dorsal about 3⅛ in length; pectoral spine 3½ to 4 in this distance; dorsal spine low, nearer snout than anal; anal rays 14 or 15; size small; color pale..... EXILIS, 25.

bb. Pectoral spines extremely strong, more than half the length of head, curved; their posterior serræ strong, spine-like, hooked backward, each about as long as the diameter of the spines:

d. Adipose fin connected with the caudal fin; distance from snout to dorsal about 2⅔ in length; pectoral spine 2⅓ in this distance; dorsal fin higher than long; body not very elongate nor much depressed; the dorsal region often somewhat elevated; the depth usually 4½ to 5 in length; head 3¾ to 4; dorsal nearer anal than tip of snout; anal 12 or 13 rays; pectoral spine curved and sharply serrate without, with six strong recurved pectinations within each as long as the diameter of the spine; body much mottled, black and grayish; top of head, tip of dorsal, middle of adipose fin, and edge of caudal definitely black; body with four broad cross-blotches, one before dorsal, one behind it, one on middle of adipose fin, and one small one behind it; size small.....MIURUS, 26.

dd. Adipose fin entirely free from caudal fin, separated from it by a space nearly equal to the diameter of the eye; spines as in *miurus* but rather weaker; head 3½ in length; depth 5½; distance to dorsal 2⅔ in length; pectoral spine 2½ in distance to dorsal; width of head 4½ in length; body moderately elongated; head broad and flat, much like that of a *Pelodichthys;* anal fin with but eleven rays; color mottled gray, faintly and irregularly spotted with darker.....ELEUTHERUS, 27.

H. Pectoral spine entire or grooved behind, never retrorse-serrate; adipose fin continuous, not notched:

e. Head small and narrow, longer than broad, with small eye; its length about 4 in body, its width 5½; upper jaw much projecting; spines very short and slender, that of the dorsal not one-third the height of the fin, and all less than one-fourth the length of head; body slender, but not elongate; distance to dorsal 2⅔ in length; pectoral spine 5 in this distance, slightly retrorse-serrate without, grooved within; depth 5½ in length; dorsal nearer anal than snout; anal 14; color mottled, rather pale ...LEPTACANTHUS, 28.

ee. Head short, broad, and deep.

f. Head shorter, narrower, and smaller in every way, than in the next, the body more elongate, more compressed but less deep, the width 4½ in length of body; length of head 4½; depth of body 5½; snout to dorsal one third of length; pectoral spine 2½ in distance to dorsal; jaws nearly equal; anal rays 15 or 16; lower barbels pale; coloration yellowish brown, with a lateral dark streak and two dorsal ones.....GYRINUS, 29.

ff. Head 3½ to 4 in length, larger than in any of the other species; width of head 3¾ in length; distance from snout to dorsal 2⅔ in length; body comparatively short and thick, the depth 4 to 5 in length; spines stout and rather long, that of the pectoral fin straight, about half the length of head; 2½ in distance to dorsal fin; entirely free from serratures outside, grooved within; dorsal higher than long, nearer anal than snout; anal high, of 13 rays; adipose fin high, continuous, without any notch at all; caudal fin arising very near anal; barbels short; the lower dark; color nearly uniform yellowish brown, never blotched; a narrow black lateral streak, which is usually conspicuous.....SIALIS, 30.

25. NOTURUS FLAVUS, *Rafinesque.*

Yellow Stone Cat—Common Stone Cat.

(Figs. 54 and 55.)

Noturus flavus, RAF. (1818), Am. Monthly Mag. and Critical Review, p. 41; (1820), Ich. Oh. 68.—KIRTLAND (1838), Rept. Zoöl. Ohio, 169, 195; (1846), Bost. Journ. Nat. Hist. iv, 336.—STORER (1846), Synopsis, 406.—GILL (1862), Proc. Bost. Soc. Nat. Hist. 45.—COPE (1864), Proc. Acad. Nat. Sci. Phila. 277; (1869), Journ. Acad. Nat. Sci. Phila. 237.—GÜNTHER (1864), Cat. Fishes, v, 104.—UHLER & LUGGER (1876), Fishes Maryland, 151.—JORDAN (1877), Ann. Lyc. Nat. Hist. N. Y.—
Noturus luteus, RAF. (1819), Journ. de Physique, 421.
Noturus occidentalis, GILL (1862), Proc. Bost. Soc. Nat. Hist. 45; 1876), Capt. ? Simpson's Rept. 423.—JORDAN & COPELAND (1876), Check List, 160.
Noturus platycephalus, GÜNTHER (1864), Catalogue Fishes, v, 104.—JORDAN & COPELAND (1876), Check List, 160.

Habitat.—Vermont and Canada to Virginia, Ohio Valley and Missouri Region.

It is not quite certain which species served as the type of Rafinesque's "*flavus*". Three distinct species occur about the Falls of the Ohio, *flavus*, *sialis*, and *miurus*. Of these, "*flavus*" is the most abundant in the immediate neighborhood of the river, the others preferring clearer water than is found in most of the streams near the falls. Rafinesque speaks of his *flavus* as being entirely yellowish, and as reaching the length of a foot. *Miurus* is never yellowish; and neither *miurus* nor *sialis*, so far as I know, reach a length of more than six inches. Moreover, the *flavus* of Kirtland, Cope, and of most writers, is the species now under consideration.

N. occidentalis Gill I also consider the same. There is nothing in the description to indicate difference, and, on examination of specimens supposed to be the original types of *occidentalis*, I am unable to find any distinctive characters whatever. Like *Ichthælurus punctatus* and *Amiurus lividus*, the *Noturus flavus* is a species of wide geographical range, and its occurrence in Nebraska is not surprising.

N. platycephalus Günther is evidently the same as *flavus*. *N. occidentalis* Günther is based on specimens of *Noturus marginatus*, sent by the Smithsonian Institution to the British Museum, Prof. Gill informs me.

I have examined specimens, which I refer to *flavus*, from Saint Lawrence River, New York, from Lake Champlain, from the Potomac River, from the Ohio River in West Virginia, in Ohio, and in Indiana, from the Miami, White, and Wabash Rivers, from the Missouri River, from Lake Michigan, and from Platte River.

24. NOTURUS INSIGNIS, (*Richardson*) *Gill & Jordan.*

Margined Stone Cat.

(Figs. 56 and 57.)

Pimelodon livrée, LE SUEUR (1819), Mém. du Mus. v, 155.

Pimelodus insigne, RICHARDSON (1836), Fauna Boreali-Americana, iii, 132 (name only, based on Le Sueur's description).

Pimelodus lemniscatus, CUV. & VAL. (1840), xv, 144.—STORER (1846), Synopsis, 405.

Noturus lemniscatus, GIRARD (1859), Proc. Acad. Nat. Sci. 158.—GILL (1862), Proc. Bost. Soc. Nat. Hist. 45.—GÜNTHER (1864), Cat. Fishes, v, 104.—JORDAN (1876), Man. Vert. 303.—JORDAN & COPELAND (1876), Check List, 160.

Noturus occidentalis, GÜNTHER (1864), Cat. Fishes, v, 105 (not of Gill).

Noturus marginatus, BAIRD, MSS.—COPE (1869), Journ. Acad. Nat. Sci. Phila. 237.—COPE (1870), Proc. Am. Philos. Soc. 484.—JORDAN & COPELAND (1876), Check List, 160.—JORDAN (1876), Ann. Lyc. Nat. Hist. N. Y. —.

Habitat.—Pennsylvania to South Carolina. This species was first noted by Le Sueur under the name of *Pimelodon livrée*, but for some reason that author neglected to give it a classical name. The name of *insigne* was supplied by Richardson, and that of *lemniscatus* by Cuvier and Valenciennes. The description of the coloration is such as to leave no possible doubt of the identity of this species with Le Sueur's.

No satisfactory description of this common fish has yet been published. It is well distinguished from *miurus* and *exilis* by the characters given above in the analysis of species.

25. NOTURUS EXILIS, *Nelson.*

Slender Stone Cat.

(Figs. 58 and 59.)

Noturus exilis, NELSON (1876), Bull. Ills. Mus. Nat. Hist. 51.—JORDAN & COPELAND (1876), Check List, 160.—JORDAN (1877), Ann. Lyc. Nat. Hist. N. Y. —.

Habitat.—Wisconsin and Illinois to Missouri and Kansas.

The synonymy of this species needs no remark. Its relations are entirely with *marginatus*, from which species it is undoubtedly distinct. Specimens from Wisconsin are much less elongate than Nelson's original types. I do not, however, consider them specifically distinct.

26. NOTURUS MIURUS, *Jordan.*

Variegated Stone Cat.

(Figs. 60 and 61.)

Noturus miurus, JORDAN, MSS.—JORDAN & COPELAND (1876), Check List, 160.—JORDAN (1877), Ann. Lyc. Nat. Hist. 46 (name only).—JORDAN (1877), Ann. Lyc. Nat. Hist. N. Y. —.

Noturus marginatus, JORDAN (1876), Man. Vert. 303.—NELSON (1876), Bull. Ills. Mus. Nat. Hist. 50 (not of Baird).

Habitat.—Great Lakes and Ohio Valley to Wisconsin and Louisiana.

This species, although a very abundant one in the Mississippi Valley, seems to have been entirely overlooked by our writers on Ichthyology; the great development and serration of the pectoral spines will always serve to distinguish it from all of the preceding. I have seen specimens from Louisiana as well as from various localities in the Ohio Valley and from Lake Michigan.

27. NOTURUS ELEUTHERUS, *Jordan.**

Free-finned Stone Cat.

(Figs. 62 and 63.)

Noturus eleutherus, JORDAN (1877), Ann. Lyc. Nat. Hist. —.

Habitat—French Broad River, Tennessee; Tar River, North Carolina.

This fish is not a variety of *miurus;* it is either a distinct species or a very remarkable monstrosity. I think now that the former is the case, and I have designated it by the above name, in allusion to the adipose fin being free from the caudal. The type-specimen from the French Broad River very strongly resembles a young *Pelodichthys*, but has the upper jaw longer. The adipose fin is, as usual, decurrent, but it is entirely separate from the beginning of the caudal.

**Noturus eleutherus*, JORDAN.—Since the first part of this paper was printed, I have been able to examine a large number of fine specimens collected by Mr. J. W. Milner, of the United States Fish Commission, in the Tar River near Tarboro', N C. These specimens show the following charaters :—

Body stout, broad forward, tapering behind. Head large, flattish, $4\frac{1}{8}$ in length of body, without caudal; depth of body $5\frac{1}{2}$ in length; width of head $4\frac{1}{2}$ in length of body. Mouth large, the upper jaw much projecting; barbels rather long. Adipose fin rather high, so deeply notched that the continuity of the fin is broken for a distance nearly equal to the diameter of the eye. A strong keel on the back in front of the adipose fin. Caudal fin rounded. Distance from snout to dorsal 3 in length of body. Pectoral spine in this distance 2 times, in head $1\frac{1}{5}$. Dorsal spine $\frac{2}{3}$ the height of the fin, $3\frac{1}{4}$ times in distance from snout to dorsal, $2\frac{1}{2}$ in length of head. Pectinations of pectoral spine very strong, recurved, nearly as long as the diameter of the spine. Front of pectoral spine with small teeth turned forward. Fin-radii: D. 1, 7; A. 12; P. 1, 8; V. 9. Color much as in *N. miurus*, extensively variegated. Snout, cheeks, and occipital region black. A black bar across front of dorsal, one behind dorsal, and another across middle of adipose fin; base of caudal fin black. One or two narrow horizontal black bars across dorsal and anal near their tips. Caudal vaguely barred, largely black, its tip white. Length of specimens $4\frac{3}{4}$ inches.

This is one of the most striking of our *Siluridæ*. Its relations are with *N. miurus* but the nearly free adipose fin will always serve to distinguish it. I have seen no pecimens of *miurus* so large and sto ut as these of *eleutherus*.

28. NOTURUS LEPTACANTHUS, *Jordan.*

Weak-spined Stone Cat.

(Figs. 64 and 65.)

Noturus leptacanthus, JORDAN (1876), MSS.—JORDAN & COPELAND, Check List, 160 (name only).—JORDAN (1877), Ann. Lyc. Nat. Hist. —.

Habitat.—Etowah River, Georgia.

But a single specimen of this species is known; it is, however, totally distinct from all the rest; its relations are chiefly with *gyrinus.*

29. NOTURUS GYRINUS, (*Mitchill*) *Rafinesque.*

Tadpole Stone Cat.

(Fig. 66 and 67.)

Silurus gyrinus, MITCHILL (1818), Am. Monthly Mag. March, 322.—DE KAY (1842), Fishes N. Y. 186.

Noturus gyrinus, RAF. (1819), Journ. de Physique, 421; (1820), Ich. Oh. 68.—GILL (1862), Proc. Bost. Soc. Nat. Hist. 45.—COPE (1869), Journ. Acad. Nat. Sci. Phila. 237.—JORDAN (1876), Man. Vert. 303.—JORDAN & COPELAND (1876), Check List, 160.—JORDAN (1877), Ann. Lyc. Nat. Hist. —.

Schilbeodes gyrinus, BLEEKER (1858), l. c.

Habitat.—Southern New York to Pennsylvania.

I have examined specimens of this species from Orange, Rockland, and Chemung Counties, New York. It resembles the next, but is in every way slenderer and weaker.

30. NOTURUS SIALIS, *Jordan*, sp. nov.

Chubby Stone Cat.

(Figs. 68 and 69.)

Noturus flavus, JORDAN (1876), Man. Vert. 303 (in part).—NELSON (1876), Bull. Ills. Mus. Nat. Hist. 50.—JORDAN (1877), Proc. Acad. Nat. Sci. Phila. 46.

Habitat.—Entire Mississippi Valley, Great Lake Region, and in Red River of the North.

Comparison of eastern and western specimens referred to *gyrinus* show surprising differences of form, and as these differences appear to be constant in a great number of specimens examined from widely separated localities, I have decided to separate the western form as a distinct species.

The eastern form, or *gyrinus*, has the head shorter and every way smaller, and the body proper more elongate, more compressed, almost ribbon-shaped, and the spines rather weaker. The coloration is the

same in both, yellowish-brown, with a lateral dark streak and two more dorsal ones. The lower barbels are usually dark in *sialis*, pale in *gyrinus*. The outline drawings of the two which accompany this paper shows the differences better than they can be expressed in words.

Noturus gyrinus is apparently a starved representative of *Noturus sialis* as *N. exilis* is of *N. insignis*, but in the latter case the "starved" form is the western one.

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CATESBY (**Mark**). The Natural History of Carolina, Florida and the Bahama Islands: containing The Figures of Birds, Beasts, Fishes, Serpents, Insects and Plants: Particularly the Forest Trees, Shrubs and other Plants not hitherto described or very incorrectly figured by Authors. Together with their Descriptions in English and French. To which is added, Observations on the Air, Soil and Waters: with Remarks upon Agriculture, Grain, Pulse, Roots, etc. To the whole is Prefixed a new and correct Map of the Country Treated of. By Mark Catesby, F. R. S. London . . . , MDCCXXXI–XLIII. 2 vols. folio.

[Contains a description and an outrageous figure of a Catfish from South Carolina. The figure is not identifiable, but has served as the basis of the earlier accounts of *Silurus catus*.]

LINNÉ (**Carl von**). Caroli Linnæi Equitis De Stella Polari, Archiatri Regii, Med. et Botan. Profess. Upsal; Acad. Upsal. Holmens. Petropol. Berol. Imper. Lond. Monspel. Tolos. Florent. Soc. Systema Naturæ per Regna Tria Naturæ, secundum Classes, Ordines, Genera, Species, cum Characteribus, Differentiis, Synonymis, Locis.—Editio Decima, Reformata. Cum Privilegio S:ae R:ae M:tis Sueciæ.—Holmiæ, Impensis Direct. Laurentii Salvii 1758. Tomus I, Regnvm Animale.

[Describes sp. n. *Silurus catus*.]

BLOCH (**Mark Elieser**) *and* **SCHNEIDER** (**Johann Gottlob**). M. E. Blochii Doctoris Medicinæ Berolinensis, et societatibus literariis multis adscripti, Systema Ichthyologiæ iconibus CX illustratum.—Post obitum auctoris opus inchoatum absolvit, correxit, interpolavit Jo. Gottlob Schneider, Saxo.—Berolini, sumtibus Auctoris impressum et bibliopolio Sanderiano commissum, 1801.

[Describes *Silurus catus* Linnæus, adding to Linnæus's account the characters "caudali pinna bifurca: dorsali et pectorali inermi, omnibus obscure rubentibus" from Catesby's figure.]

MITCHILL (**Samuel Latham**). Memoir on Ichthyology. The Fishes of New York described and arranged. In a supplement to the Memoir on the same subject, printed in the New York Literary and Philosophical Transactions, vol. i, pp. 355, 492. By Samuel L. Mitchill. < The American Monthly Magazine and Critical Review, vol. ii, (New York), pp. 241–248, 321–328, 1818.

[Description of *Silurus gyrinus* sp. nov.]

RAFINESQUE (**Constantine Samuel**). Discoveries in Natural History, made during a Journey through the Western Region of the United States by Constantine Samuel Rafinesque, esq. Addressed to Samuel L. Mitchill, President, and other members of the Lyceum of Natural History in a letter dated at Louisville, Falls of the Ohio, 20th July, 1818. < American Monthly Magazine and Critical Review, New York, September, 1818.

[Describes *Silurus punctatus* and *olivaryg· is* sp. nov.]

RAFINESQUE (Constantine Samuel). Further account of Discoveries in Natural History in the Western States, by Constantine Samuel Rafinesque, esq. Communicated in a letter from that gentleman to the editor, Lexington, October 5, 1818. <American Monthly Magazine and Critical Review, November, 1818.

[Describes *Noturus flavus* gen. et sp. nov.]

——— Prodrome de 70 nouveaux Genres d'Animaux découverts dans l'intérieur des États-Unis d'Amérique durant l'année 1818. <Journal de Physique, de Chymie et d'Histoire Naturelle, Paris, June, 1819.

[Describes *Noturus luteus* and *Pilodictis limosus* gen. et sp. nov.]

LE SUEUR (Charles A.). Notice de quelques Poissons découverts dans les lacs du Haut-Canada, durant l'été de 1816, par Ch. A. Le Sueur. <Mémoires du Muséum d'Histoire Naturelle, Paris, 1819, tome cinquième.

[Describes sp. nov. *Pimelodus albidus*, *P. nebulosus*, *P. æneus*, *P. caudafurcatus*, *P. nigricans*, *P. natalis*, and (without Latin name) *Pimelodon livrée* (= *P. insigne* Rich., *P. lemniscatus* C. & V.).]

RAFINESQUE (Constantine Samuel). Description of the Silures or Cat-Fishes of the River Ohio, by C. S. Rafinesque, Professor of Botany in the Transylvania University of Lexington, Kentucky. <Quarterly Journal of Science, Literature and Arts, Royal Institution, London, 1820, ix.

[Describes the following new species and varieties:—*Silurus maculatus* (= *S. punctatus*, 1818); var. *erythroptera*; *S. pallidus*; var. *marginatus*; var. *lateralis*; var. *leucoptera*; *S. cerulescens*; var. *melanurus*; *S. argentinus*; *S. nebulosus* (= *S. olivaris*, 1818); *S. viscosus*; *S. lividus*; var. *fuscus*; *S. melas*; *S. cupreus*; *S. xanthocephalus*; and *S. limosus*.]

——— Ichthyologia Ohiensis or Natural History of the Fishes Inhabiting the River Ohio and its Tributary Streams. Preceded by a physical description of the Ohio and its branches by C. S. Rafinesque, Professor of Botany and Natural History in Transylvania University, Author of the Analysis of Nature, &c., &c., member of the Literary and Philosophical Society of New York, the Historical Society of New York, the Lyceum of Natural History of New York, the Academy of Sciences of Philadelphia, the American Antiquarian Society, the Royal Institute of Natural Sciences of Naples, the Italian Society of Arts and Sciences, the Medical Societies of Lexington and Cincinnati, &c., &c.—The art of seeing well, or of noticing and distinguishing with accuracy the objects which we perceive is a high faculty of the mind, unfolded in few individuals, and despised by those who can neither acquire it, nor appreciate its results.—Lexington, Kentucky, printed for the Author by W. G. Hunt (price one dollar).—1820. (1 vol., 8vo, 90 pp.)

[Originally printed in the Western Review and Miscellaneous Magazine, Lexington, Kentucky, 1819–20. It contains redescription of all the species previously indicated by the author, thirteen in number; the name *S. argentinus* is changed to *Pimelodus argyrus*, and the genus *Pimelodus* is divided into a number of subgenera and sections: *Ictalurus*, *Elliops*, *Leptops*, *Opladelus*, *Amiurus*, *Ilictis*, etc.]

——— Extracts from A Second Series of Zoological Letters written to Baron Cuvier of Paris, by Prof. Rafinesque in 1831. <Atlantic Journal and Friend of Knowledge, Philadelphia, 1832, pp. 19–22.

[Describes numerous shells, worms, "*Porostomes*",* etc. I copy the part relating to fishes for the edification of ichthyologists:—

"I send you, as you request, the figure, description, and a specime of my *Trinectes Sculpta*, a new G. of fish near to *Achirus* found in the River Schuylkill; it has only three fins: dorsal anal and caudal. "Also the description and figure of a large and beautiful new catfish from the River

* "This name is very good, but if not agreeable to all, I have half a dozen others to offer as substitutes: *Biopores*, or *Zoopores*, or *Leptremes*, or *Adelostomes*, &c. Because it is my wish that this class or large section of animals should bear a good name given by me, instead of the delusory one of *Animalcula* or *microscopic animals*, which does not apply to all. . . . The *Miasmata* or miasmic animalcula of the air, may be the invisible birds of this class, or aerial insects floating in the air."—(RAF. op. cit., p. 21.)

Tennessee discovered in 1823, *Pimelodus lutescens*; it was three feet long, excellent to eat, of a olivaceous yellow colour, belly white, jaws equal, eyes round, tail forked, first dorsal falciform, second dorsal nearly as large as the anal."—(RAF., *l. c.*, p. 20.)

"I send you also the figures and descriptions of five new fishes No. 3 to 7. *Zonipus punctatus*, *Semotilus notatus*, *Lepemiurus fasciolatus* and *bilineatus*, *Luxilus auratilus* and *Zonargyra virescens*. All observed in the waters of Kentucky since publishing my Ichthyology of the Ohio in 1820, except the *Lepemiurus*."—(RAF., *l. c.*, p. 22.)]

RICHARDSON (**John**). Fauna-Boreali-Americana; or the Zoology of the Northern Parts of British America containing descriptions of the objects of Natural History collected on the late Northern Land Expeditions under command of Captain Sir John Franklin, R. N. Part third. The Fish. By John Richardson, M. D., F. R. S., F. L. S., Member of the Geographical Society of London, and Wernerian Natural History Society of Edinburgh; Honorary Member of the Natural History Society of Montreal, and Literary and Philosophical Society of Quebec; Foreign Member of the Geographical Society of Paris; and Corresponding Member of the Academy of Natural Science of Philadelphia; Surgeon and Naturalist to the Expeditions.—Illustrated by numerous plates.—Published under the authority of the Right Honorable the Secretary of State for Colonial Affairs.—London: Richard Bentley. New Burlington Street—MDCCCXXXVI.

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STORER (**David Humphreys**). A Report on the Fishes of Massachusetts. By D. Humphreys Storer, M. D. < Boston Journal of Natural History, vol. ii, 1839, pp. 289–558.

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CUVIER (**Georges Chrétien Leopold Dagobert**) *and* **VALENCIENNES** (**Achille**). Histoire Naturelle des Poissons par M. le B.on Cuvier, Pair de France, Grand Officier de la Légion d'honneur, Conseiller de l'État et aux Conseil royal de l'Instruction publique, l'un des quarante de l'Académie française, Associé libre de l'Académie des Belles-Lettres, Secrétaire perpetuelle de celle des Sciences, Membre des Sociétés et Académies royales de Londres, de Berlin, de Pétersbourg, de Stockholm, de Turin, de Gœttingue, des Pays-Bas, de Munich, de Modène, etc.; et par M. A. Valenciennes, Professeur de Zoologie au Muséum d'Histoire naturelle, Membre de l'Académie royale des Sciences de Berlin, de la Société Zoologique de Londres, etc. Tome quinzième. À Paris, chez Ch. Pitois, éditeur, rue de la Harpe, n°. 81. Strasbourg, chez Ve. Lévrault, rue des Juifs, n°. 33, 1840.

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[Describes *Noturus luteus* and *Pilodictis limosus* gen. et sp. ... America, by ... ston Society of ... city, Corresponding ... ia, etc. Cambridge: ... Reprinted from Memoirs

LE SUEUR (Charles A.). Notice de quelques Po ... Haut-Canada, durant l'été de 1816, par Ch. A. ... d'Histoire Naturelle, Paris, 1819, tome cinqui ...

[Describes sp. nov. *Pimelodus albidus*, *P. nebulos* ... *natalis*, and (without Latin name) *Pimelodon liver* ... from the accounts given by Cuvier

RAFINESQUE (Constantine Samuel). ... of the River Ohio, by C. S. Rafinesq ... University of Lexington, Kentucky ... Character, Vegetation, and Animals ... and Arts, Royal Institution, Lond ... egions, by Louis Agassiz, with a narra- ... contributions by other scientific gentle- ... Gould, Kendall and Lincoln, 59 Washington

[Describes the following new species ... *erythroptera*; *S. pallidus*; var. *margi* ... *lanurus*; *S. argentinus*; *S. nebulos* ... *S. melas*; *S. cupreus*; *S. xanthoce* ... sp. nov., and outlines a division of the genus *Pimelodus* into

——— Ichthyologia Ohiensis ... Ohio and its Tributary ... Annual Report of the Regents of the University of ... and its branches by C ... Condition of the State Cabinet of Natural History, ... Transylvania Univer ... and antiquarian collection annexed thereto. Albany: C. Van ... the Literary and Pl ... the Legislature. 1852. ... York, the Lyceur ... Philadelphia, th ... Sciences of Na ... of Lexingto ... Texas, New Mexico and Sonora by Mr. John H. Clark on ... distinguish ... and Mexican Boundary Survey and in Texas by Capt. Stewart ... the mind ... by S. F. Baird and Charles Girard. < Proceedings of the ... quire it, ... Sciences, Philadelphia, vol. vii, 1854, pp. 24–29. ... by W. ...

[Ori ... *Pimelodus affinis* sp. nov. This species is here stated to be a very near affine ... 1819–9 ... From old labels in the museum, it appears that the species called by me ... in n ... was identified by Dr. Girard with *Pimelodus cœrulescens*, while the *Pimelo* ... div ... Girard is what I call *Ichthœlurus punctatus*.] ... ur ...

HOLBROOK (John Edward). An account of several species of Fish observed in ... Florida, Georgia, &c. By John Edward Holbrook, M. D., Professor of Anatomy, ... &c., Charleston, S. C. < Journal of the Academy of Natural Sciences, Philadel- ... phia, vol. iii, second series, pp. 47–58, 1855.

[Description and figure of *Amiurus marmoratus*.]

STORER (David Humphreys). A History of the Fishes of Massachussetts. By David Humphreys Storer. < Memoirs of the American Academy of Arts and Sciences (Boston), new series. (1853 to 1867.)

[Description and good figure of *Pimelodus atrarius*.]

GIRARD (Charles). Notes on various New Genera and New Species of Fishes in the Museum of the Smithsonian Institution and Collected in Connection with the United States and Mexican Boundary Survey, Major William Emory, Commissioner. By Charles Girard, M. D. < Proceedings of the Academy of Natural Sciences of Philadelphia, 1858, pp. 167–171.

[Description of *Pimelodus vulpes* sp. nov.]

GIRARD (Charles). Explorations and Surveys for a Railroad Route from the Mississippi River to the Atlantic Ocean. War Department.—Fishes: By Charles Girard, M. D.—Washington, D. C. 1858. <Reports of Explorations and Surveys to ascertain the most practicable and economical route for a Railroad Route from the Mississippi River to the Pacific Ocean, vol. x.

[Describes sp. nov. *Pimelodus catulus*, *P. felinus*, *P. antoniensis*, *P. ailurus*, *P. lupus*, and *P. olivaceus*, with figures of *catulus*, *ailurus* and *olivaceus*.]

BLEEKER (Pieter von). Ichthyologiæ Archipelagi Indici Prodromus, vol. I. Siluri. <Acta Societatis Scientiarum Indo-Nederlandicæ, vol. iv, 1858.

[Characterizes a new genus *Schilbeodes*, based on supposed characters of *Silurus gyrinus* Mitchill.]

GIRARD (Charles). United States and Mexican Boundary Survey, under the order of Lieut. Col. W. H. Emory, Major First Cavalry and United States Commissioner.—Ichthyology of the Boundary, by Charles Girard, M. D. <United States and Mexican Boundary Survey, vol. II, part I, 1859.

[Describes and figures *Pimelodus affinis* and *P. vulpes*.]

——— Ichthyological Notices by Charles Girard, M. D. <Proceedings of the Academy of Natural Sciences of Philadelphia, 1859, vol. xi, pp. 157–161.

[Describes sp. nov. *Pimelodus houghi*, *P. hoyi*, *P. confinis*, *P. cupreoides*, *P. dekayi*, *P. lynx*, *P. puma*, *P. vulpeculus*, *P. platycephalus*, *P. megalops*, and *P. graciosus*; refers *P. lemniscatus* Le Sueur to the genus *Noturus*; and describes a *P. catus*, supposed to be *Silurus catus* of Linnæus. The descriptions in this paper are short, unsatisfactory, and often inaccurate. The type-specimens are, however, still preserved.]

GILL (Theodore Nicholas). Description of a new genus of Pimelodinæ from Canada. By Theo. Gill. <Annals of the Lyceum of Natural History of New York, vol. vii, pp. 45–48, 1859.

[Description of *Synechoglanis beadlei*, gen. et sp. nov.]

ABBOTT (Charles Conrad). Descriptions of two new species of Pimelodus, from Kansas. By Charles C. Abbott. <Proceedings of the Academy of Natural Sciences of Philadelphia, 1860, pp. 568–569.

[Descriptions of *Pimelodus hammondii* and *P. notatus* sp. nov.]

GILL (Theodore Nicholas). Description of new species of Pimelodinæ (abridged from the forthcoming Report of Captain J. H. Simpson) by Theodore Gill. <Proceedings of the Boston Society of Natural History, vol. viii, pp. 42–46, April, 1861.

[Describes n. sp. *Ictalurus simpsoni*, *Amiurus obesus*, and *Noturus occidentalis*, and gives a catalogue of the species described from the fresh waters of America.]

——— Synopsis of the genera of the subfamily of Pimelodinæ. By Theodore Gill. <Proceedings of the Boston Society of Natural History, vol. viii, pp. 46–55. April, 1861.

[Characterizes the genera.]

GÜNTHER (Albert). Catalogue of the Fishes in the British Museum. By Albert Günther, M. A., Ph. D., F. Z. S., etc., etc. Volume fifth. London: printed by order of the trustees. 1864.

[Describes 18 nominal species and enumerates 20 more; sp. n. *Amiurus meridionalis* and *Noturus platycephalus*.]

COPE (Edward Drinker). On a blind Silurid, from Pennsylvania, by E. D. Cope. <Proceedings of the Academy of Natural Sciences of Philadelphia, 1864, pp. 231–233.

[Description of *Gronias nigrilabris* gen. et sp. nov.]

COPE (**Edward Drinker**). On the Distribution of Fresh Water Fishes in the Alleghany Region of South-Western Virginia. By E. D. Cope, A. M. < Journal of the Academy of Natural Sciences of Philadelphia, new series, vol. vi, part iii, January, 1869, pp. 207–247.

[First description of *Noturus marginatus* Baird, analysis of species of *Noturus*, and notices of *Hopladelus olivaris* and *Ichthælurus cœrulescens*.]

GÜNTHER (**Albert**). An Account of the Fishes of the States of Central America based on Collections made by Capt. J. M. Dow, F. Godman, Esq., and O. Salvin, Esq. By Albert Günther, M. A., M. D., Ph. D., F. R. S., F. Z. S. < Transactions of the Zoological Society of London, vol. vi, 1869, pp. 377–494.

[Description and figure of *Amiurus meridionalis*.]

STAUFFER (**Jacob**). In "Mombert's History of Lancaster County, Pennsylvania, 1869, p. 578" (*fide* Cope).

[Descriptions of *Ictalurus kevinskii* and *I. macaskeyi* sp. nov.]

COPE (**Edward Drinker**). Partial Synopsis of the Fishes of the Fresh Waters, of North Carolina, by Edw. D. Cope, A. M. < Proceedings of the American Philosophical Society of Philadelphia, 1870, pp. 448–495.

[Describes sp. nov. *Amiurus mispilliensis*, *A. lophius*, and *A. nivicentris*, with an analysis of the species of *Amiurus* and notes on some other species.]

JORDAN (**David Starr**). Manual of the Vertebrates of the Northern United States, including the district east of the Mississippi River, and north of North Carolina and Tennessee, exclusive of marine species. By David Starr Jordan, M. S., M. D., Professor of Natural History in N. W. C. University, and in Indiana State Medical College. Chicago: Jansen, McClurg & Company. 1876.

[Describes briefly 23 species.]

JORDAN (**David Starr**) *and* **COPELAND** (**Herbert Edson**). Check List of the Fishes of the Fresh Waters of North America, by David S. Jordan, M. S., M. D., and Herbert E. Copeland, M. S. < Bulletin of the Buffalo Society of Natural Sciences, ii, 1876, pp. 133–164.

[48 nominal species enumerated.]

UHLER (**P. R.**) *and* **LUGGER** (**Otto**). List of Fishes of Maryland, by P. R. Uhler and Otto Lugger. < Report of the Commissioners of Fisheries of Maryland, pp. 67–176. (1876.)

[Descriptions of *Noturus flavus*, *Amiurus catus*, and *A. lynx*.]

NELSON (**Edward W.**). A Partial Catalogue of the Fishes of Illinois, by E. W. Nelson. < Bulletin of the Illinois Museum of Natural History, i, 1876.

[Description of *Noturus exilis* sp. nov., and notes on other species.]

GILL (**Theodore Nicholas**). Engineer Department, U. S. Army. Explorations across the Great Basin of Utah in 1859. In charge of Capt. J. H. Simpson, Topographical Engineers.=Report on Ichthyology. By Prof. Theo. Gill.—Washington: Government Printing Office. 1876.

[Full description and figures of *Ictalurus simpsoni*, *Amiurus obesus*, *Noturus occidentalis*, and *Hopladelus olivaris*, with full synonymy and characterization of the genera.]

JORDAN (**David Starr**). A Partial Synopsis of the Fishes of Upper Georgia, by David S. Jordan, M. D. < Annals New York Lyceum of Natural History, 1877, pp. —.

[Describes n. sp. *Amiurus brunneus*, *Noturus leptacanthus*, *N. miurus*, and *N. eleutherus*.]

—— Review of Rafinesque's Writings on the Fresh Water Fishes of North America, by David S. Jordan. < Bulletin United States National Museum, ix, 1877.

[Contains identifications of the various species described by Rafinesque.]

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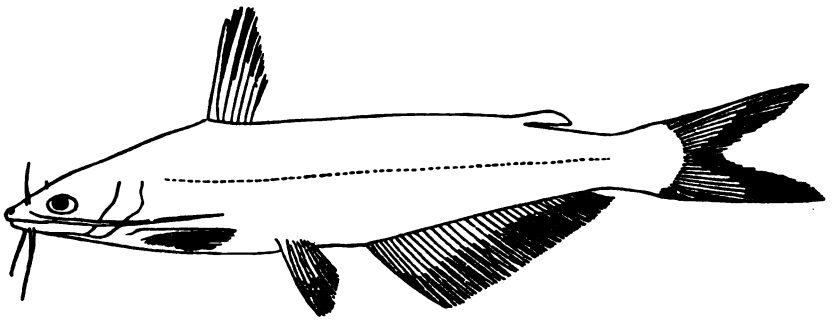


FIG. 1—Ichthælurus furcatus (*C. & V.*) Gill.
Texas. From types of *affinis*

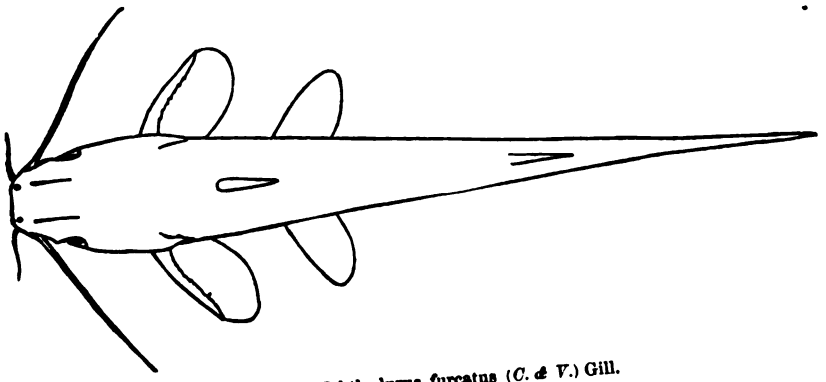


FIG. 2—Ichthælurus furcatus (*C. & V.*) Gill.
Texas. From types of *affinis*.

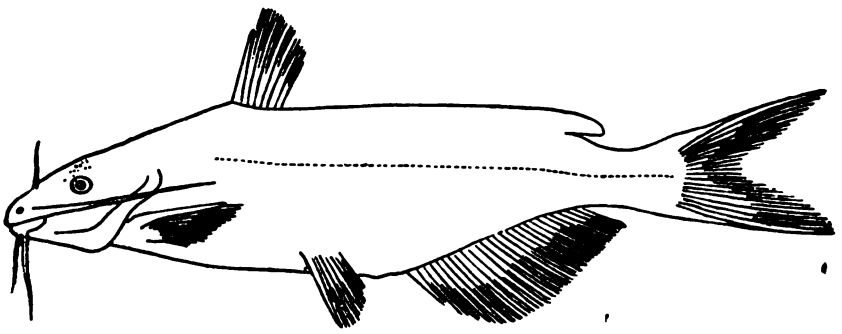


FIG. 3—Ichthælurus robustus (*Jordan.*)
(From type.)

PLATE 2.

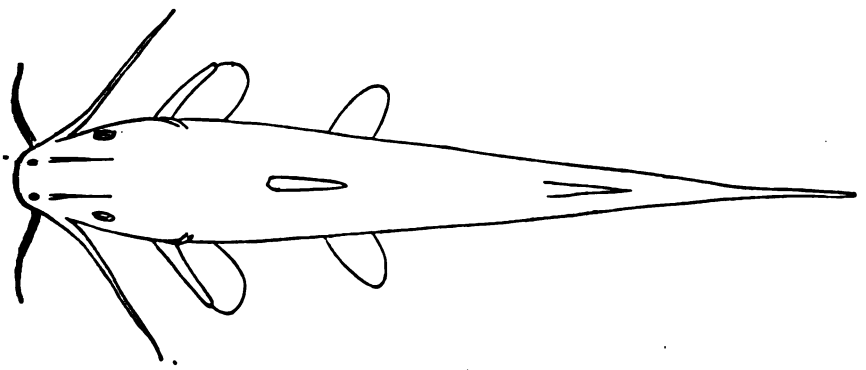


FIG. 4—Ichthælurus robustus (*Jordan.*)
(From type.)

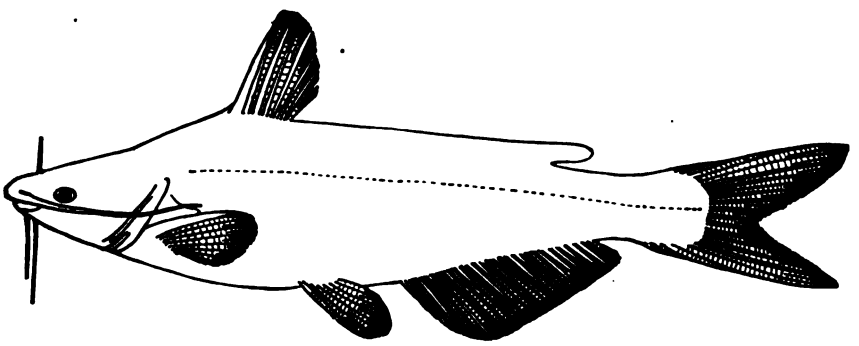


FIG. 4 (*b*)—Ichthælurus robustus (*Jordan.*)
Illinois River. Reduced one-half.

PLATE 3.

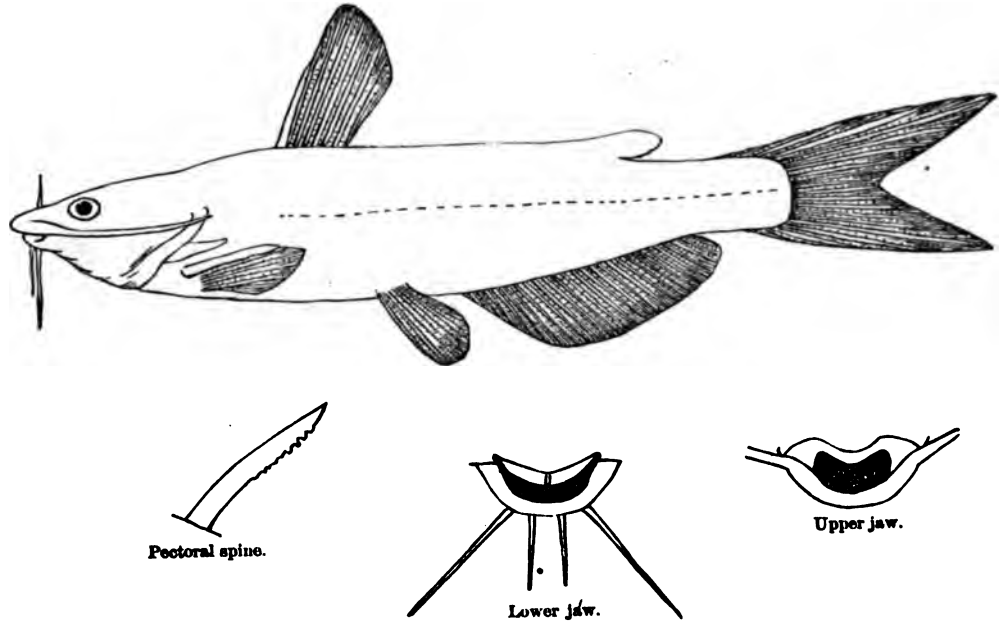


FIG. 5—Ichthælurus punctatus (*Raf.*) Jor.
Chattahoochee R., Ga. Reduced one-half.

PLATE 4.

FIG. 6—Ictalurus punctatus (Raf.) Jor.
Chattahoochee R., Ga. Reduced one-half.

PLATE 6.

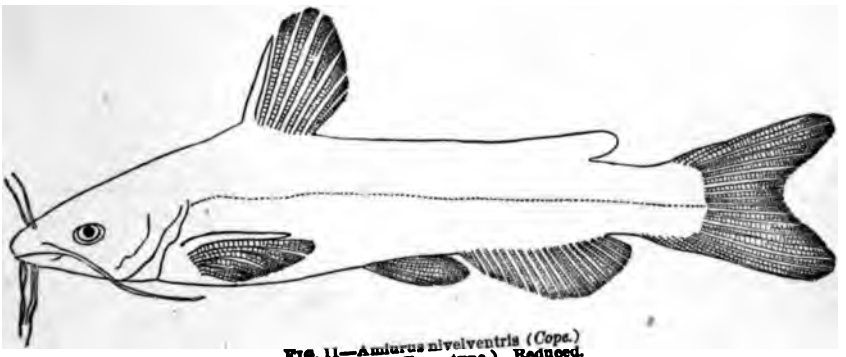


FIG. 11—Amiurus niveiventris (*Cope.*)
Neuse River. (From type.) Reduced.

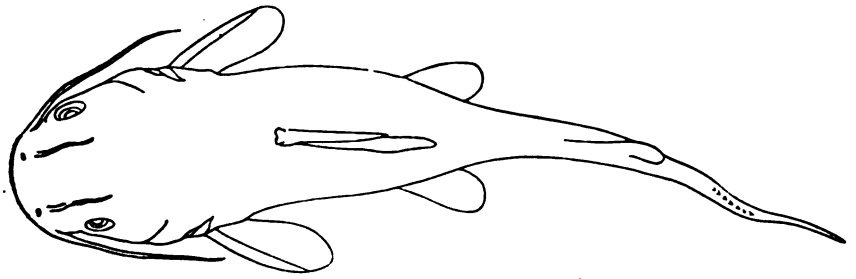


FIG. 12—Amiurus niveiventris (*Cope.*)
Neuse River. (From type.) Reduced.

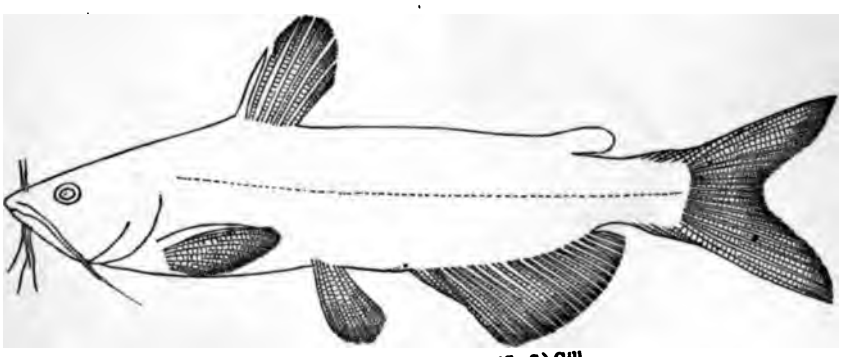


FIG. 13—Amiurus nigricans (*Le S.*) Gill.
Lake Erie.

PLATE 6.

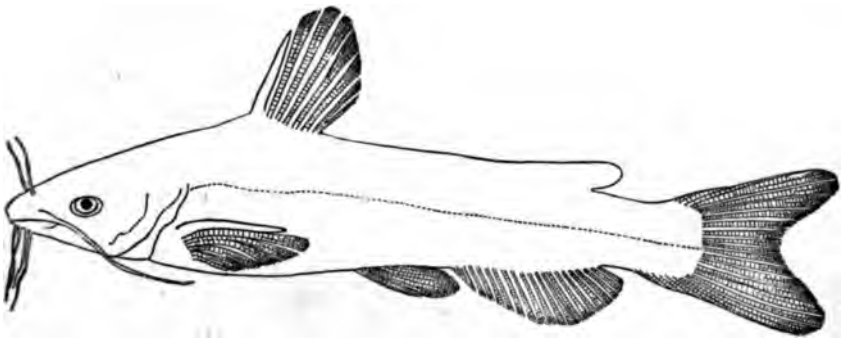


FIG. 11—Amiurus niveiventris (*Cope.*)
Neuse River. (From type.) Reduced.

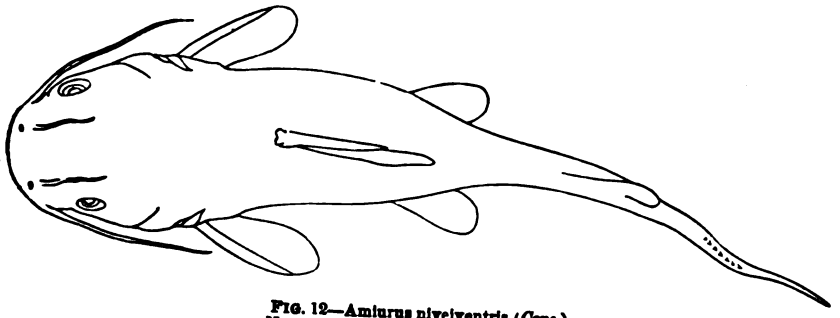


FIG. 12—Amiurus niveiventris (*Cope.*)
Neuse River. (From type.) Reduced.

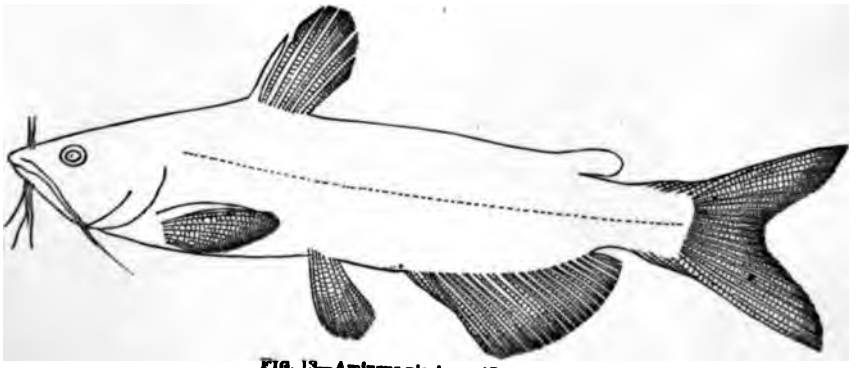


FIG. 13—Amiurus nigricans (*Le S.*) Gill.
Lake Erie.

PLATE 7.

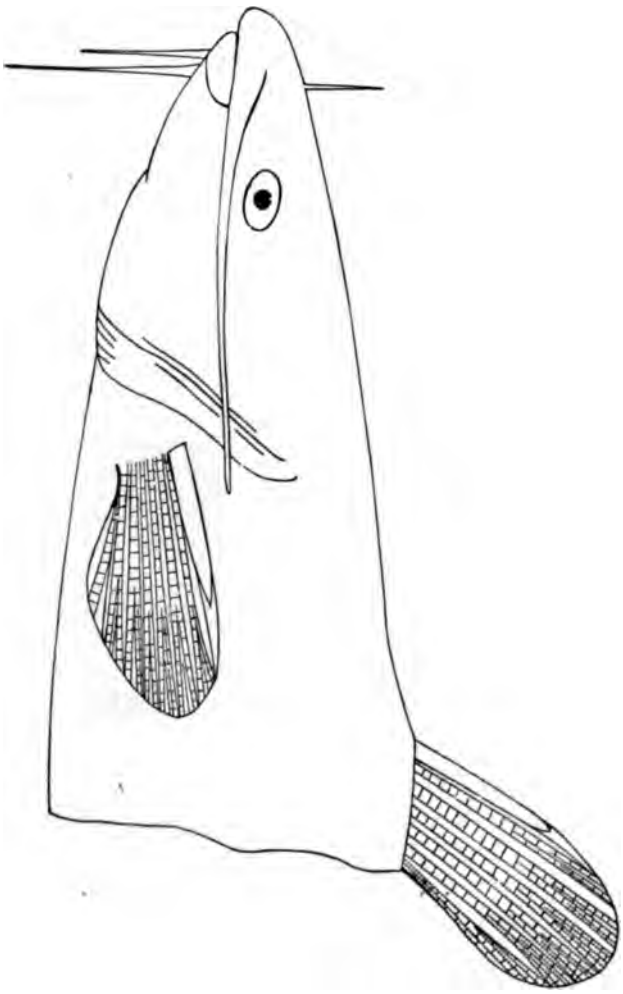


FIG. 14 (9)—Amiurus nigricans (*Le S.*) Gill. Ohio R., Leavenworth, Ind. Reduced one-half.

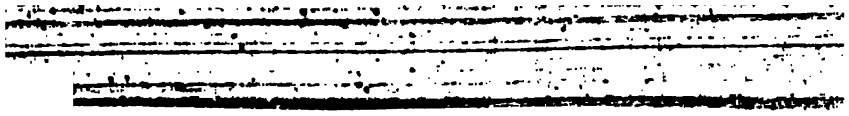


PLATE 8.

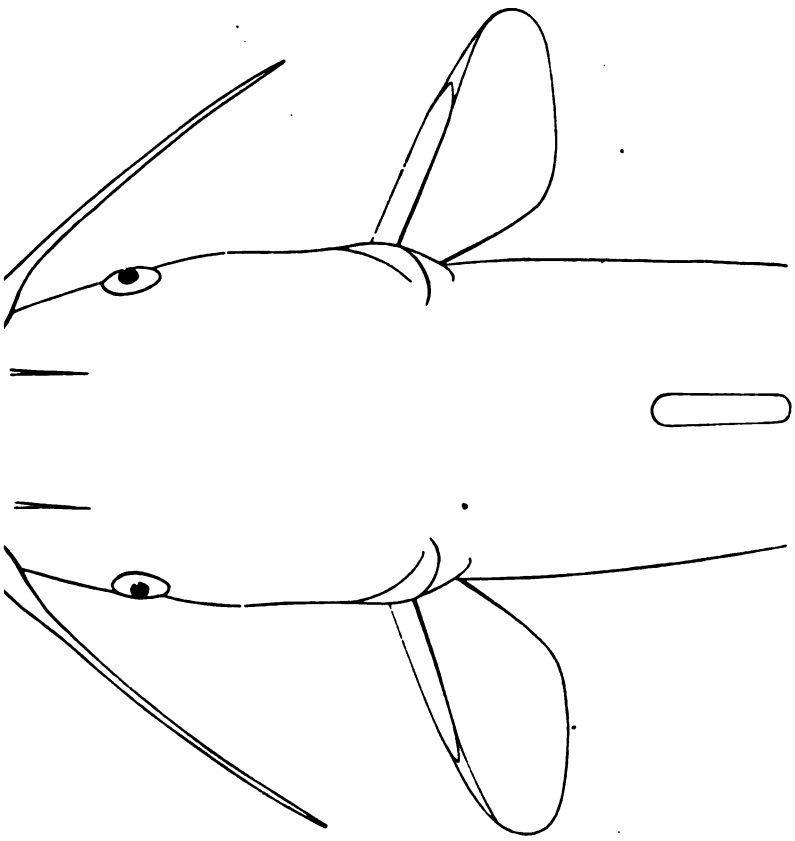


FIG. 14 (c)—Amiurus nigricans (*Le S.*) Gill.
Ohio R., Leavenworth, Ind. Reduced one-half.

PLATE 10.

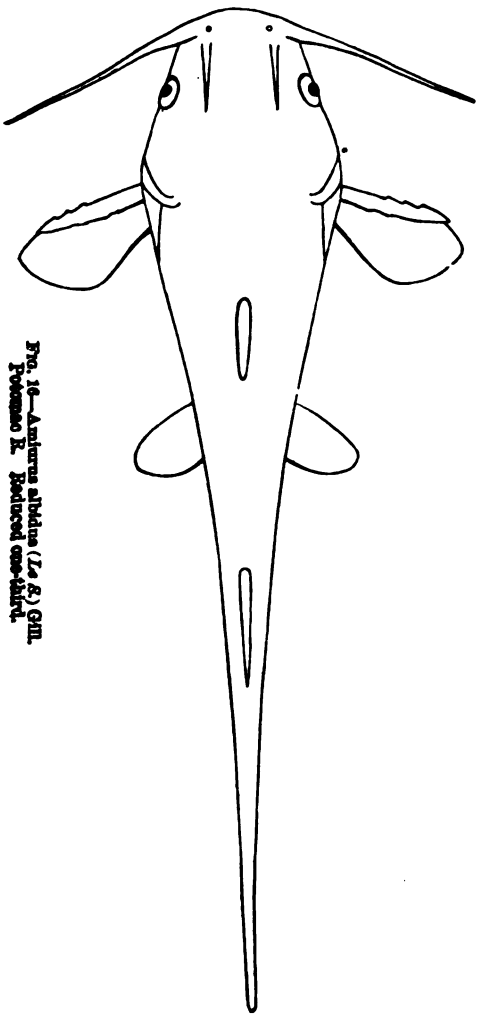


FIG. 16—Amiurus albidus (*Le S.*) Gill.
Potomac R. Reduced one-third.

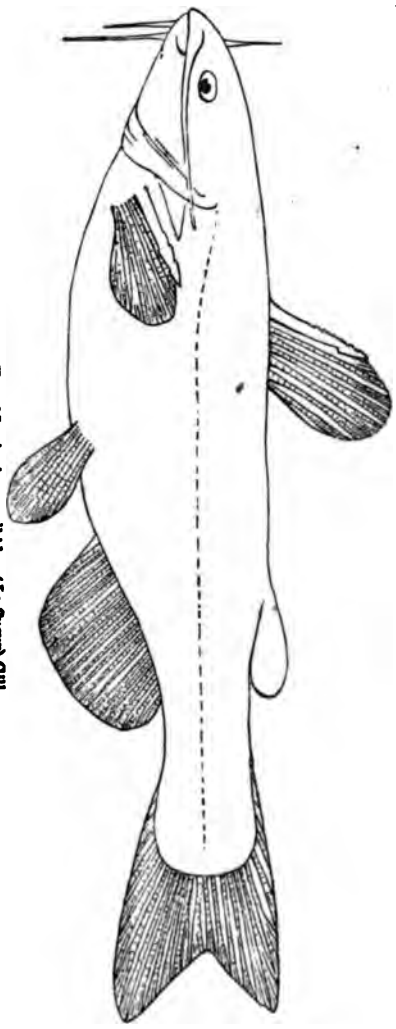


FIG. 15—Amiurus albidus (*Le Sueur*) Gill.
Potomac R. Reduced one-third.

PLATE 11.

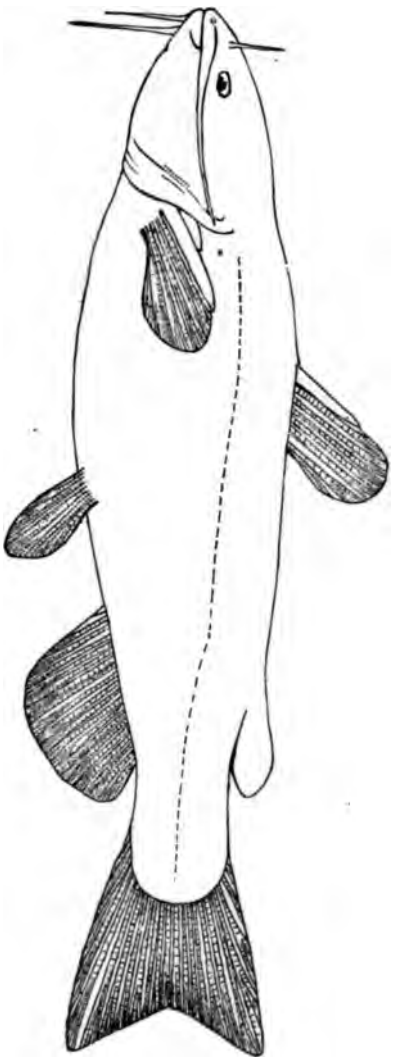


FIG. 17—Amiurus lophius (Ogpa)
Potomac River. Reduced one-half.

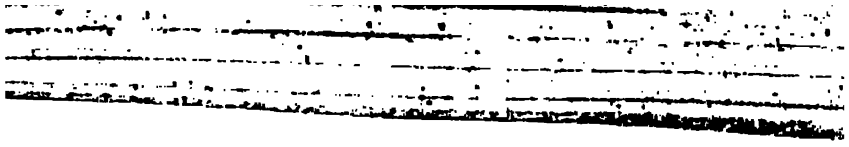


PLATE 12.

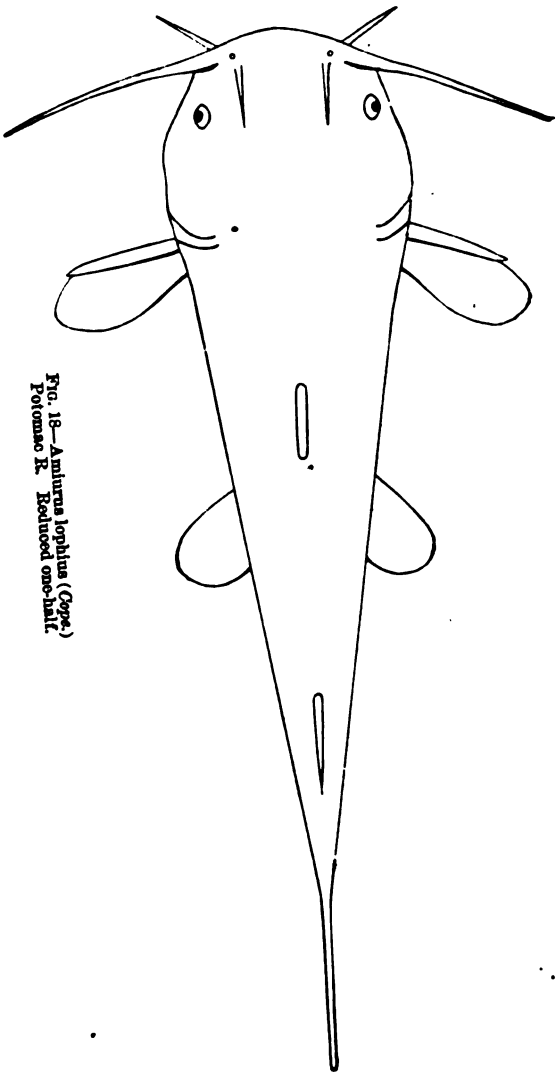


FIG. 18—Amiurus lophius (Cope.)
Potomac R. Reduced one-half.

PLATE 13.

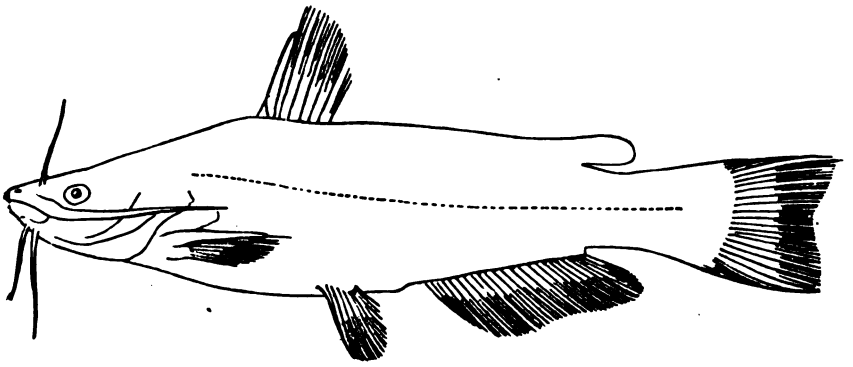


FIG. 19—Amiurus erebennus Jordan.
St. John's R., Fla. From type.

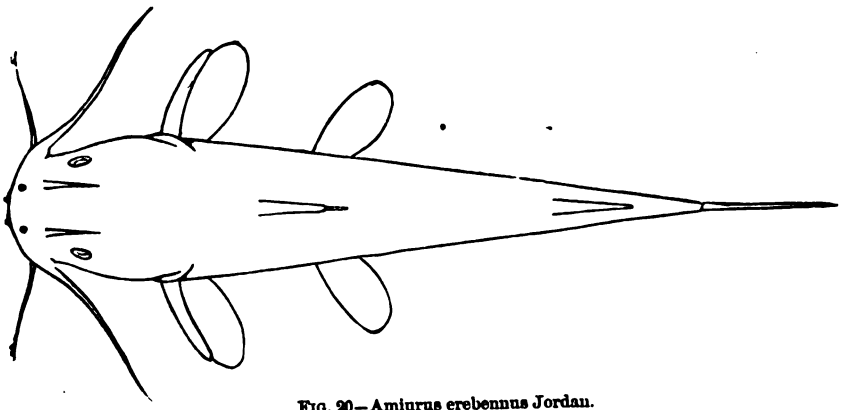


FIG. 20—Amiurus erebennus Jordan.
St. John's R., Fla. From type.

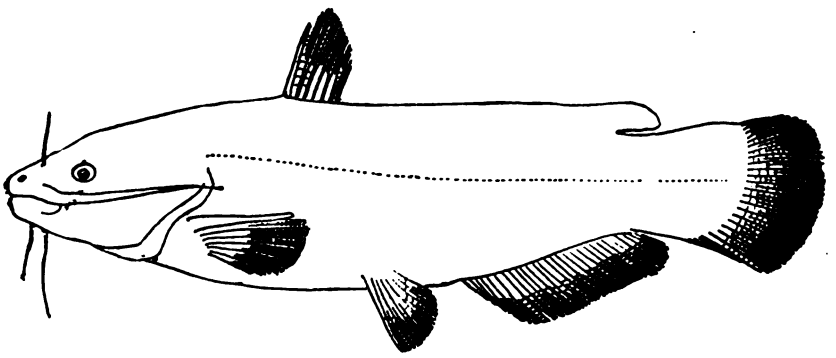


FIG. 21—Amiurus natalis (*Le S.*) Gill.
(Var. natalis)
Lake Erie.

PLATE 14.

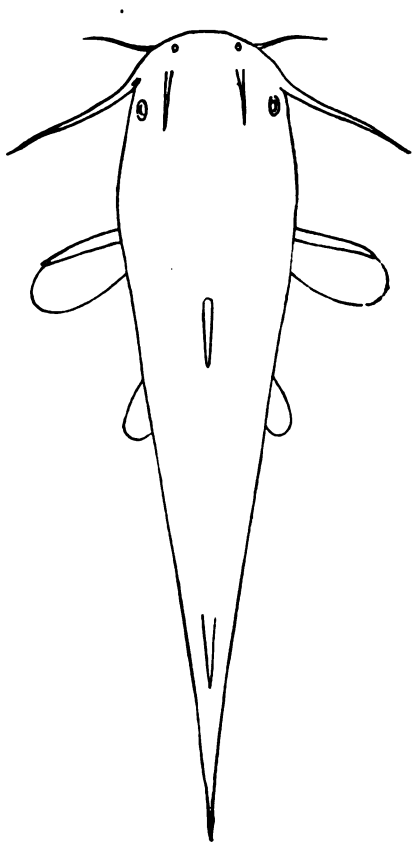


FIG. 22—Amiurus natalis (*Le. S.*) Gill. (Var. natalis.) Lake Erie.

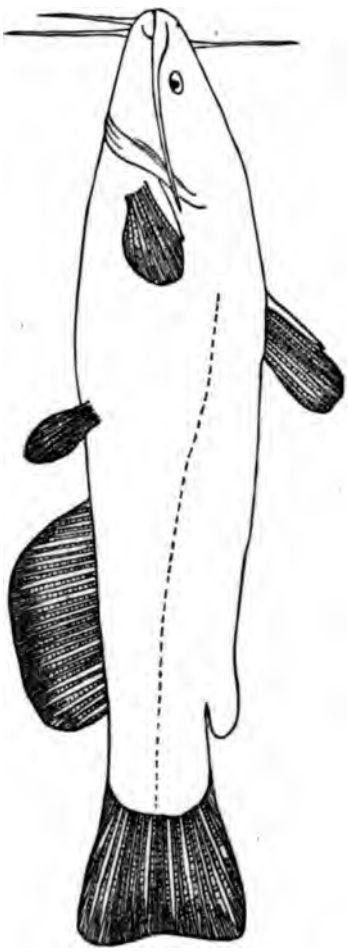


FIG. 23—Amiurus natalis lividus (*Raf.*) Jor. Illinois R. Reduced one-half.

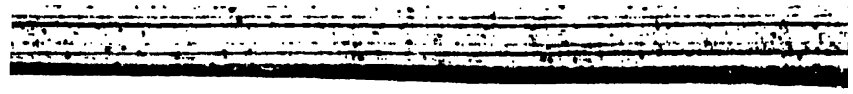


PLATE 15.

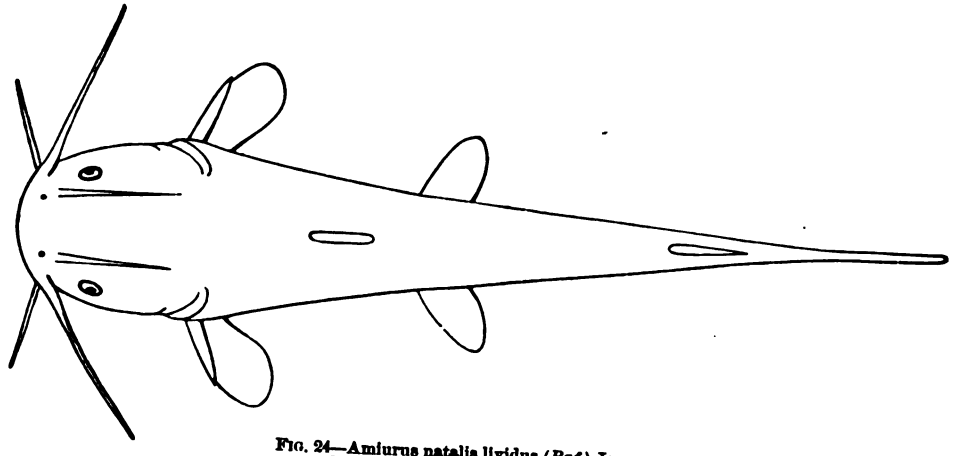


FIG. 24—Amiurus natalis lividus (*Raf.*) Jor.
Illinois R. Reduced one-half.

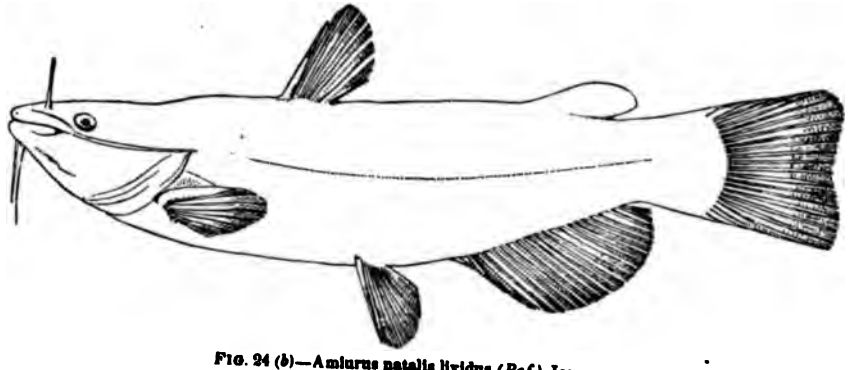


FIG. 24 (*b*)—Amiurus natalis lividus (*Raf.*) Jor.
Kinston, N. C Reduced.

PLATE 16.

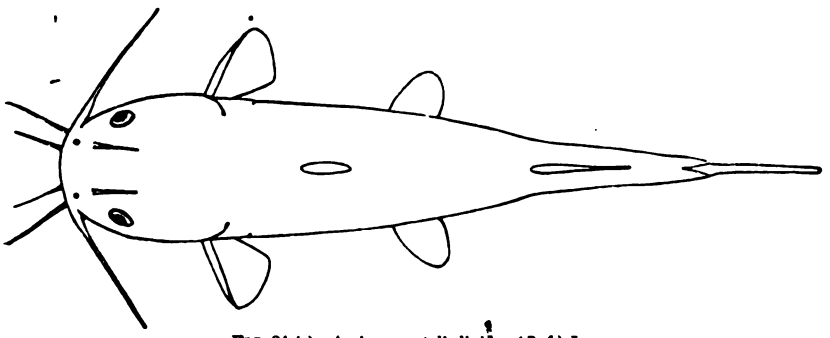


FIG. 24 (c)—Amiurus natalis lividus (*Raf.*) Jor.
Kinston, N. C. Reduced.

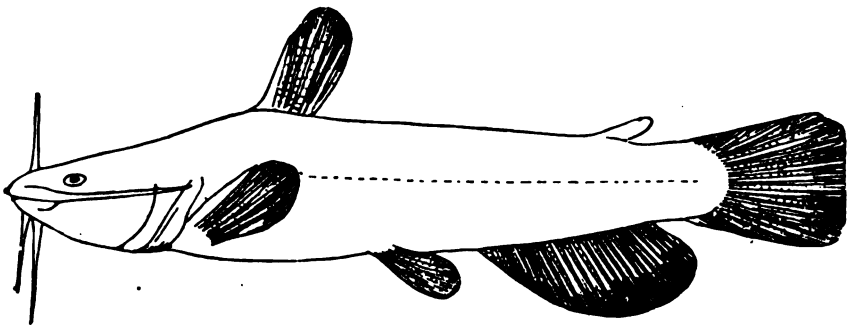


FIG. 25—Amiurus natalis cœnosus (*Rich.*) Jor.
L. Michigan. Reduced one-half.

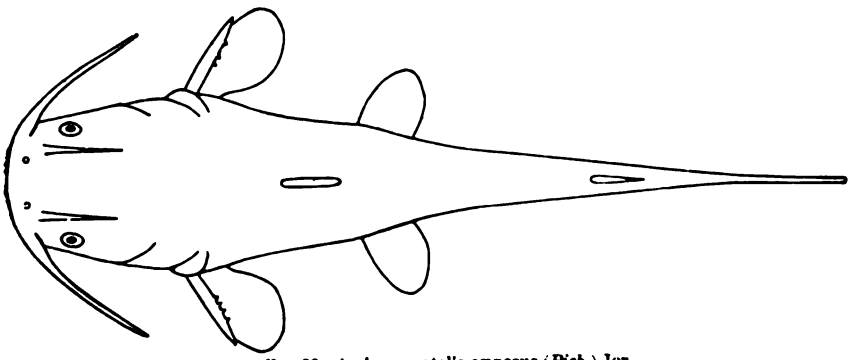


FIG. 26—Amiurus natalis cœnosus (*Rich.*) Jor.
Lake Michigan. Reduced one-half.

PLATE 17.

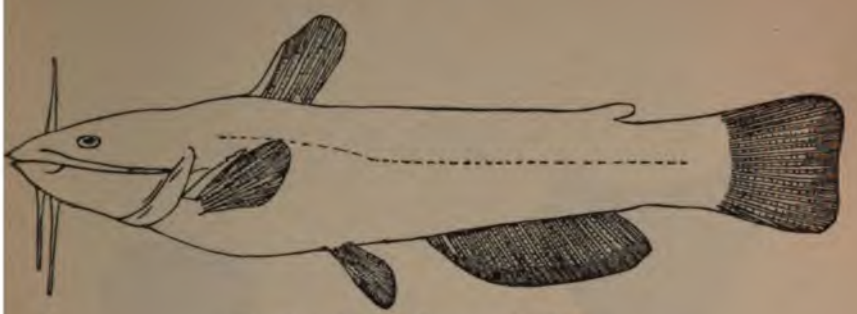


FIG. 27—Amiurus natalis cupreus (*Raf.*) Jor.
White R., Ind. Reduced one-third.

Dentition lower jaw

Dentition upper jaw.

FIG. 28—Dentition of Amiurus natalis cupreus.

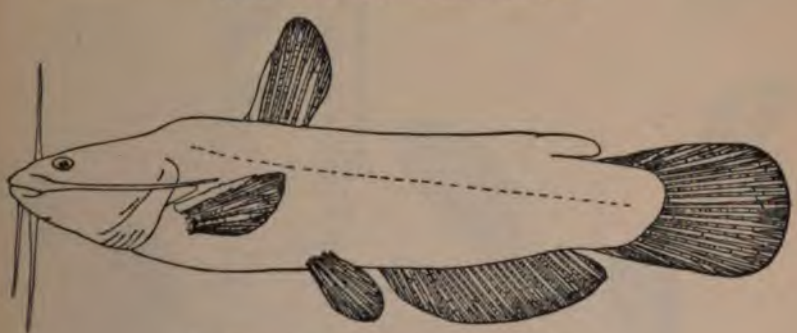


FIG. 29—Amiurus natalis antomensis (*Grd.*) Jor.
Etowah R., Ga.

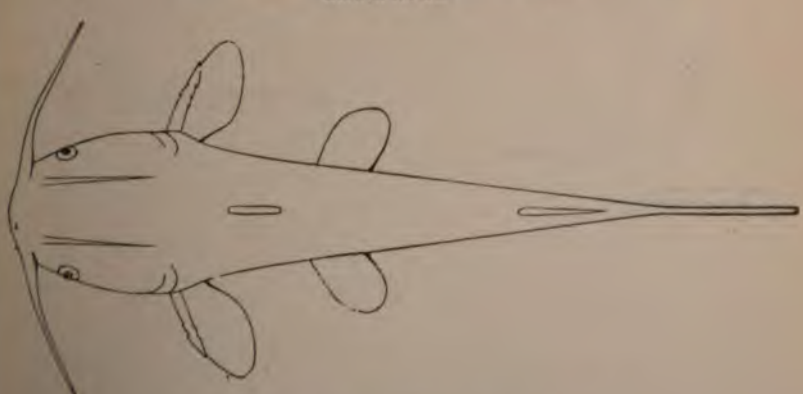


FIG. 30—Amiurus natalis antoniensis (*Grd.*) Jor.
Etowah River, Georgia.

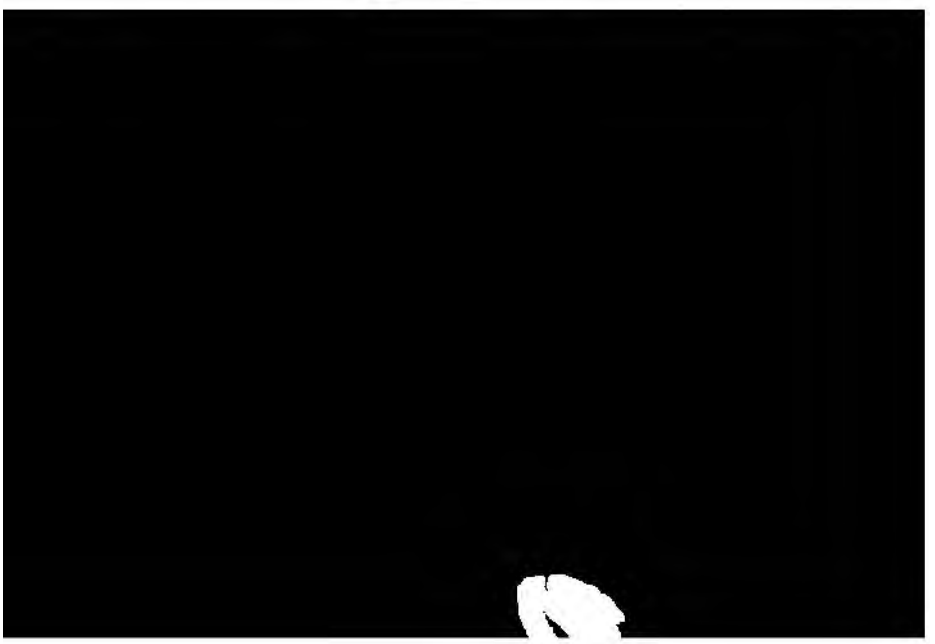


PLATE 18.

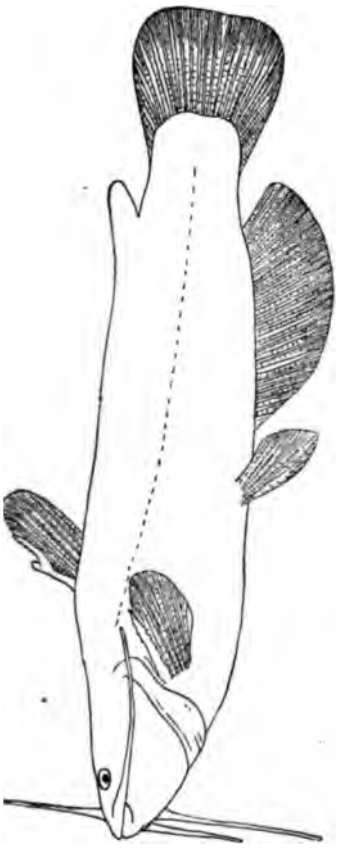


FIG. 31—Amiurus natalis analis (*Jordan.*)
Little Red R., Ark. Nat. size type.
(Dorsal spine abnormal.)

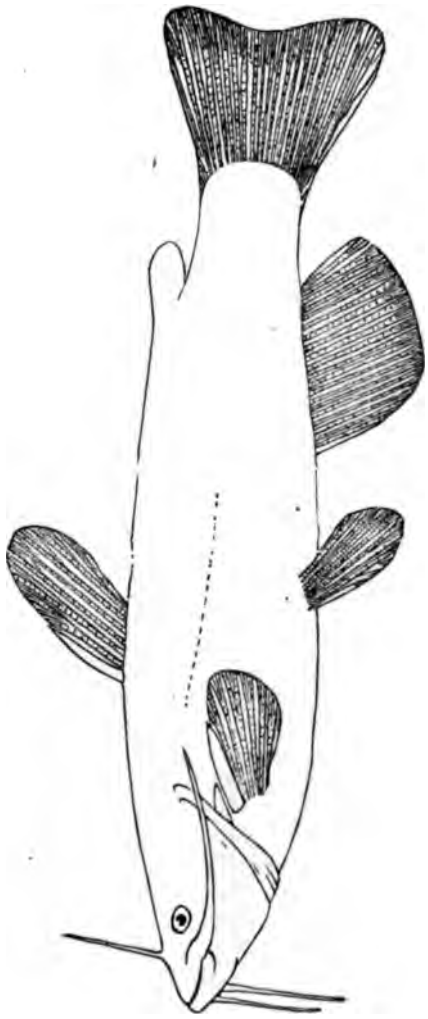


FIG. 33—Amiurus vulgaris (*Thompson*) Nels.
Lake Michigan. Reduced one-half.

PLATE 19.

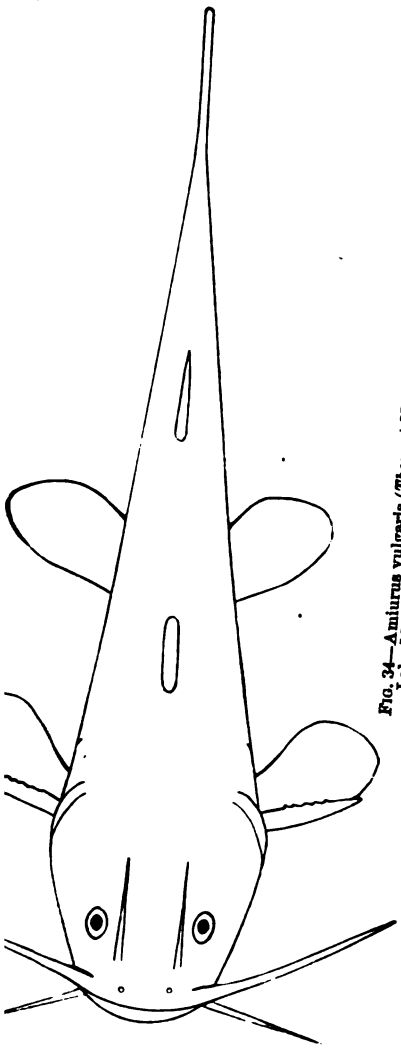


FIG. 34—Amiurus vulgaris (*Thomp.*) Nels.
Lake Michigan. Reduced one-half

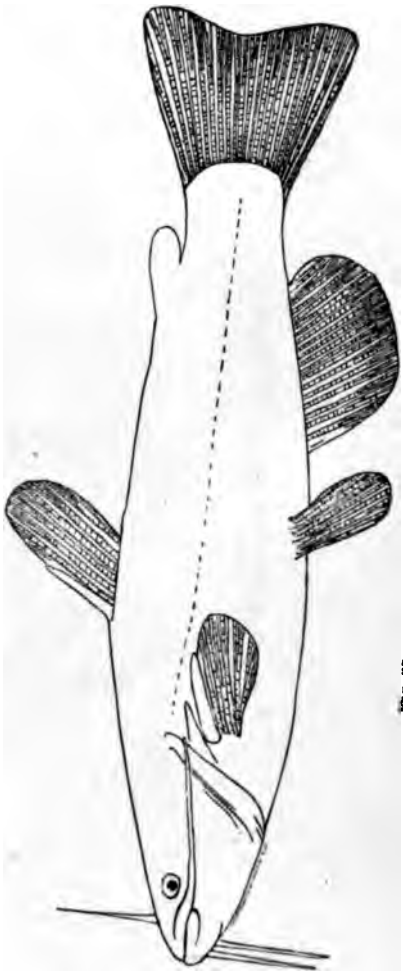


FIG. 35—Amiurus vulgaris (*Grd.*) Jor.
Illinois R. Reduced one-half.

PLATE 20.

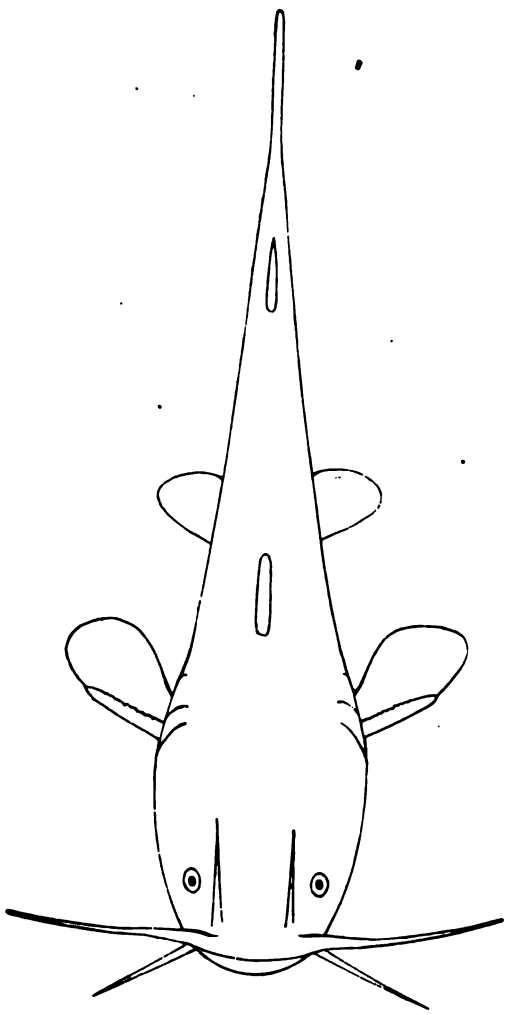


FIG. 35 (b)—Amiurus vulgaris amarus (*Grd.*) Jor.
Mississippi River. Reduced one-half.

PLATE 21.

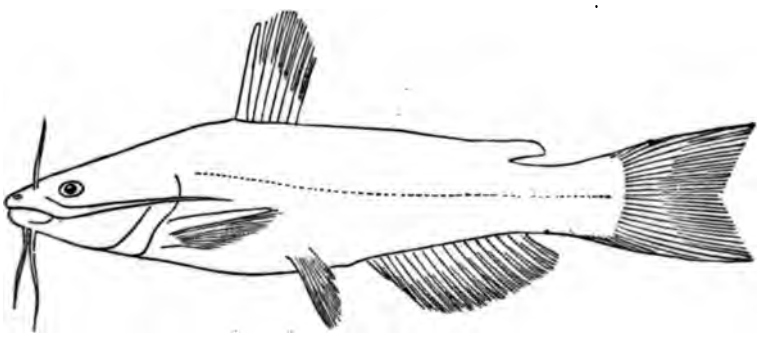


FIG. 36—Amiurus marmoratus (*Holbr.*) Jor.
Altamaha R.

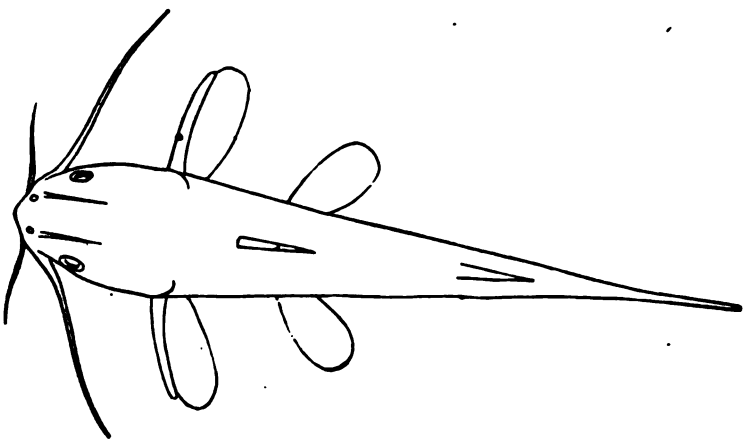


FIG. 37—Amiurus marmoratus (*Holbr.*) Jor.
Altamaha R.

PLATE 22.

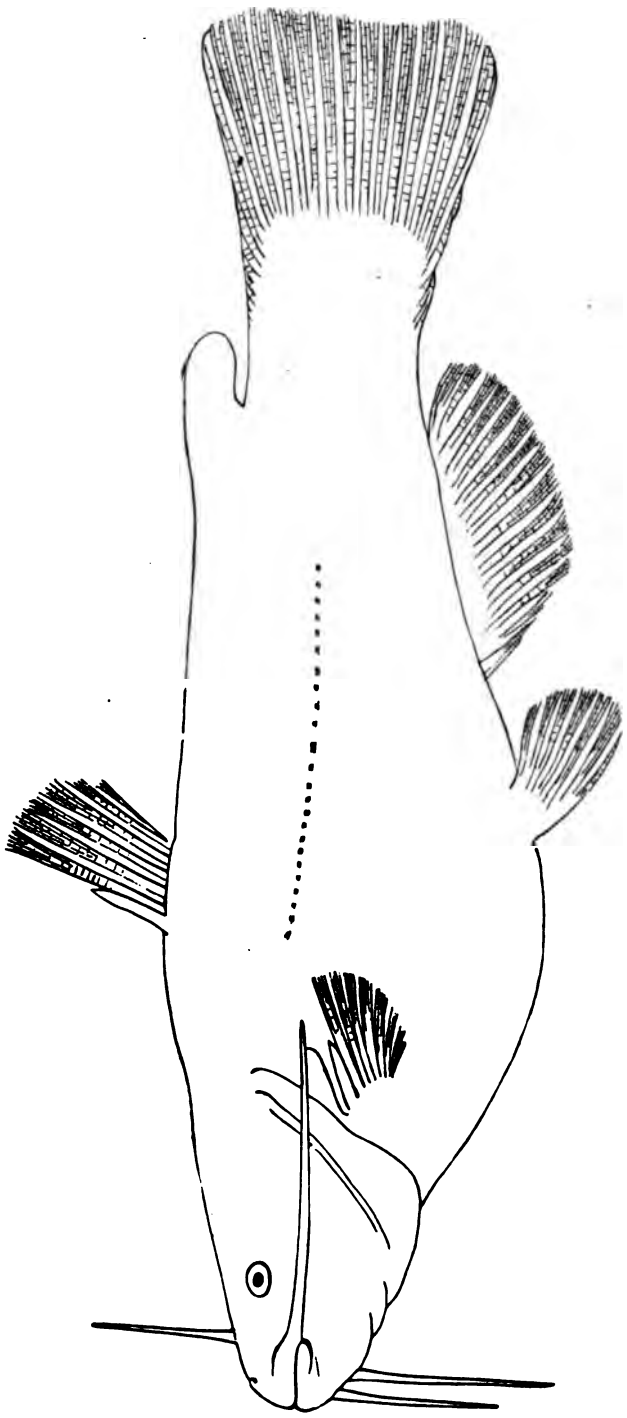


FIG. 38—Amiurus melas (*Raf.*) Jordan & Copeland.
Illinois R. Reduced one-half.

PLATE 23.

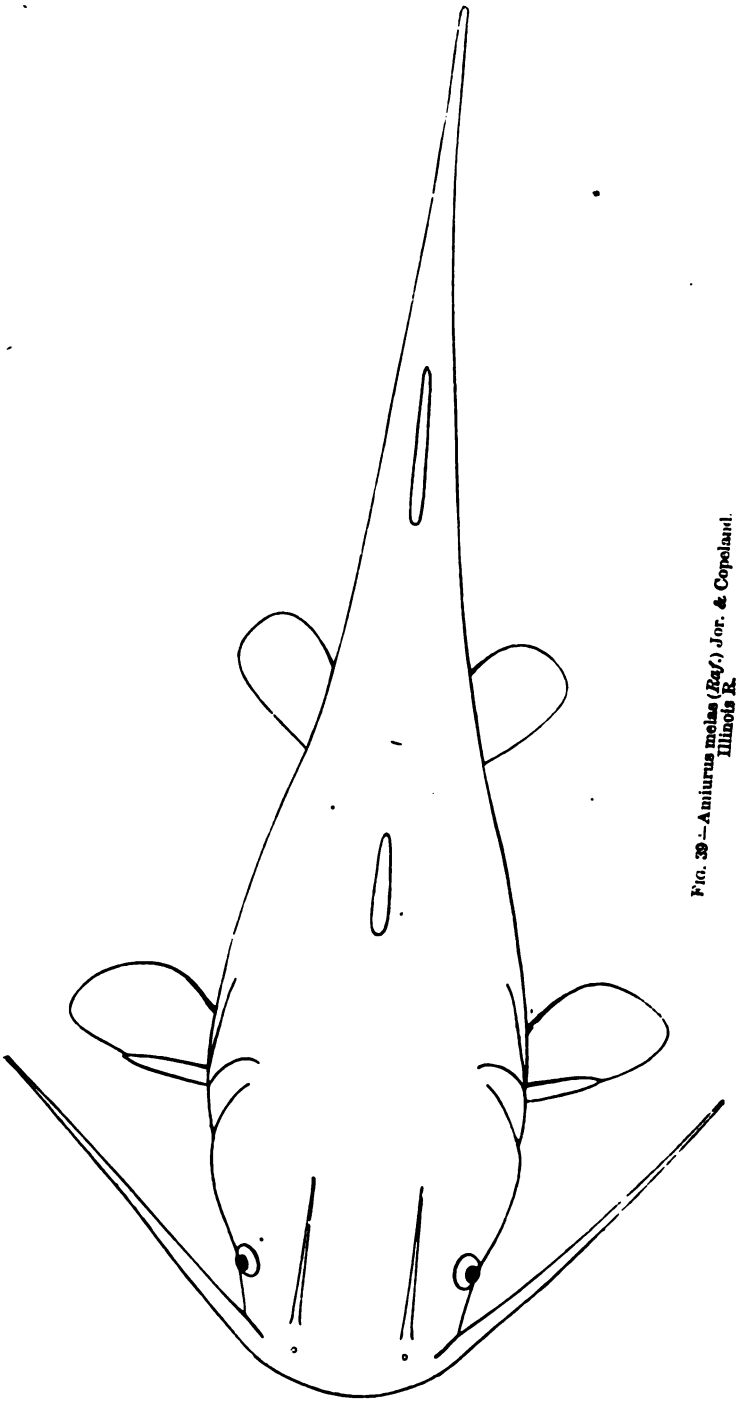


FIG. 39.—Amiurus melas (Raf.) Jor. & Copeland.
Illinois R.

PLATE 24.

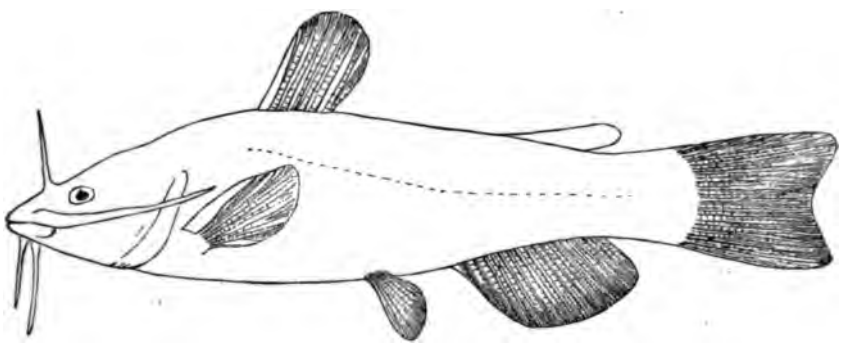


FIG. 39 (*b*)—Amiurus melas (*Raf.*) Jor. & Copeland
Illinois R.

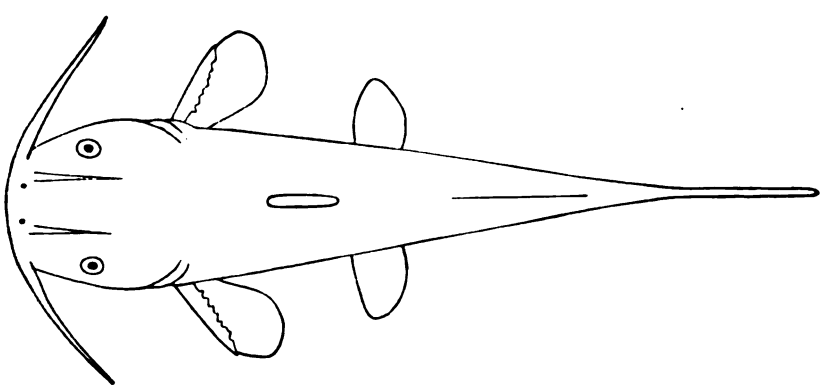


FIG. 39 (*c*)—Amiurus melas (*Raf.*) Jor. & Copeland.
Illinois R. Reduced one-half.

PLATE 25.

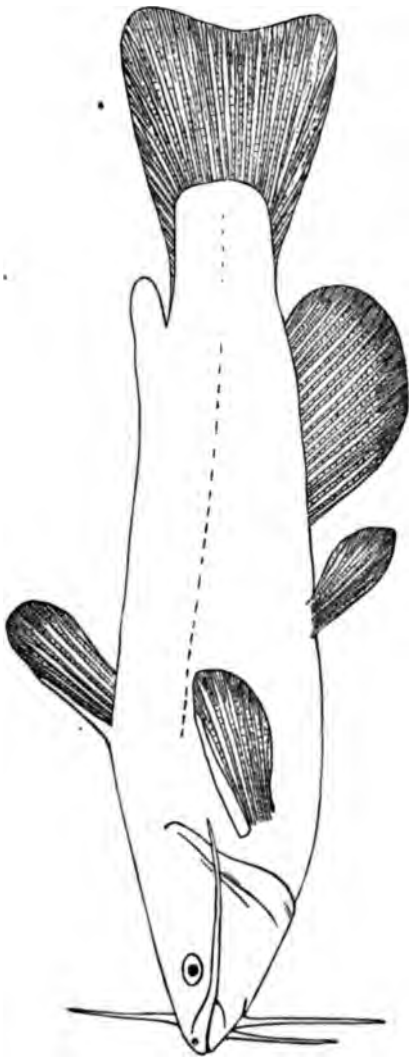


FIG. 40—Amiurus catus (*L.*) Gill.
Delaware R.

PLATE 26.

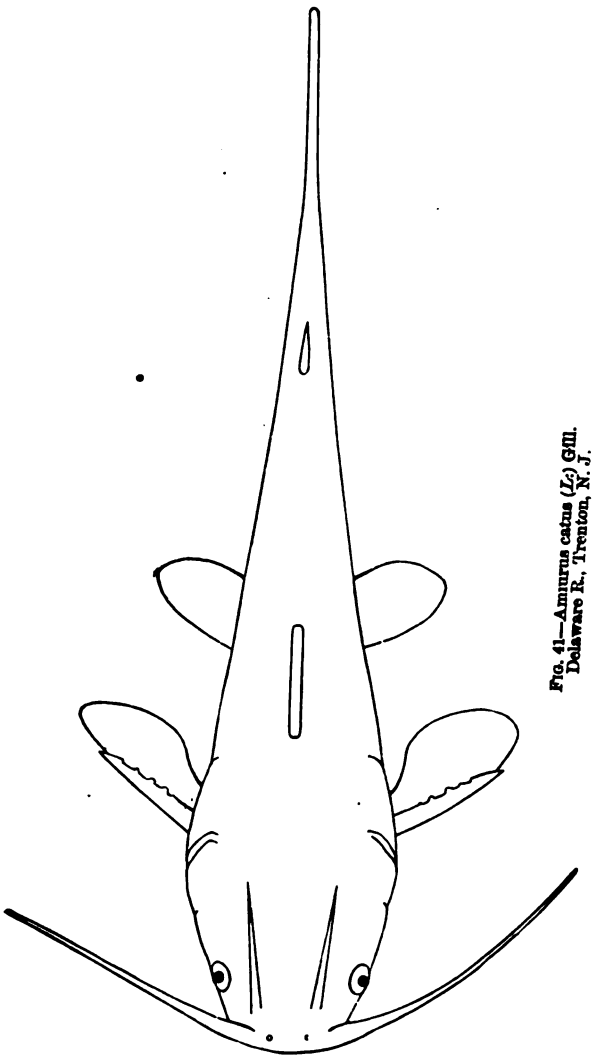


FIG. 41—Amiurus catus (*L.*) Gill.
Delaware R., Trenton, N. J.

PLATE 27.

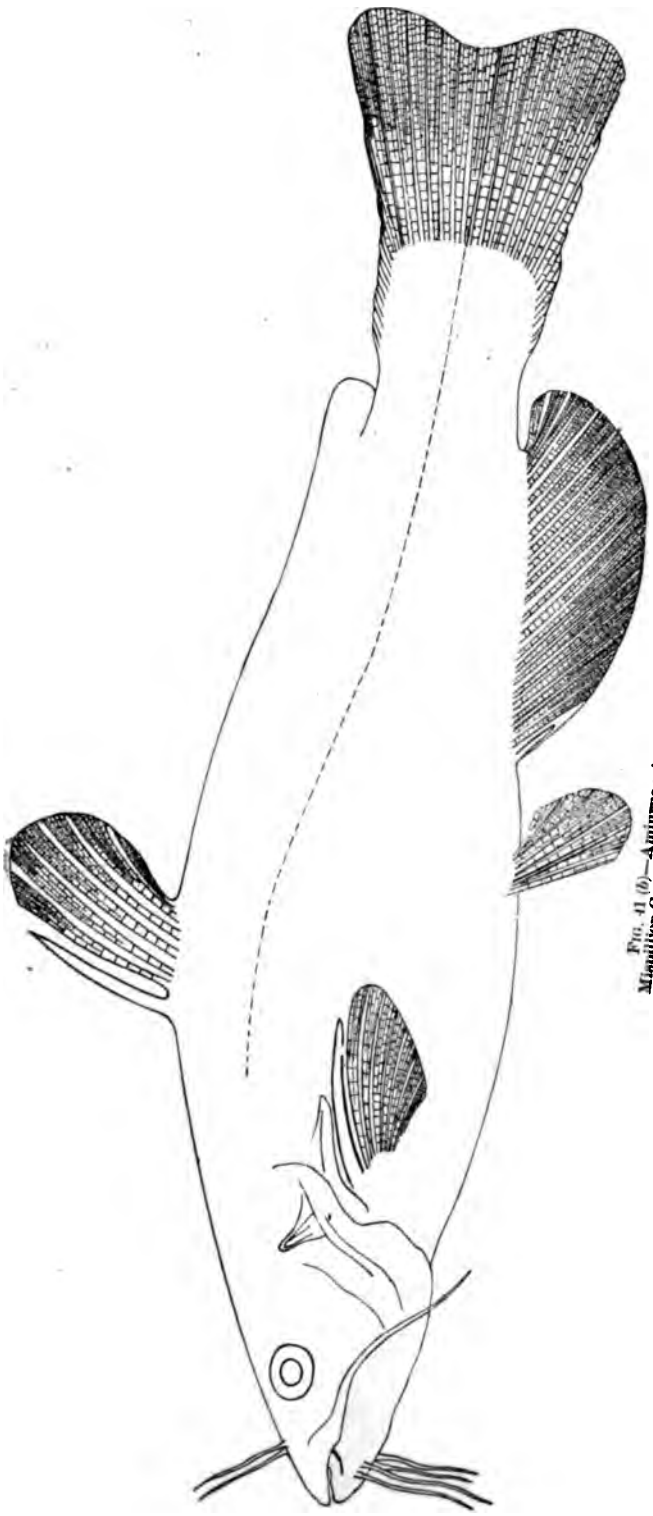


FIG. 41 (b).—Anaurus mispillionis (Cope.)
Mispillion Creek, Delaware. Nat. size from types.

PLATE 28.

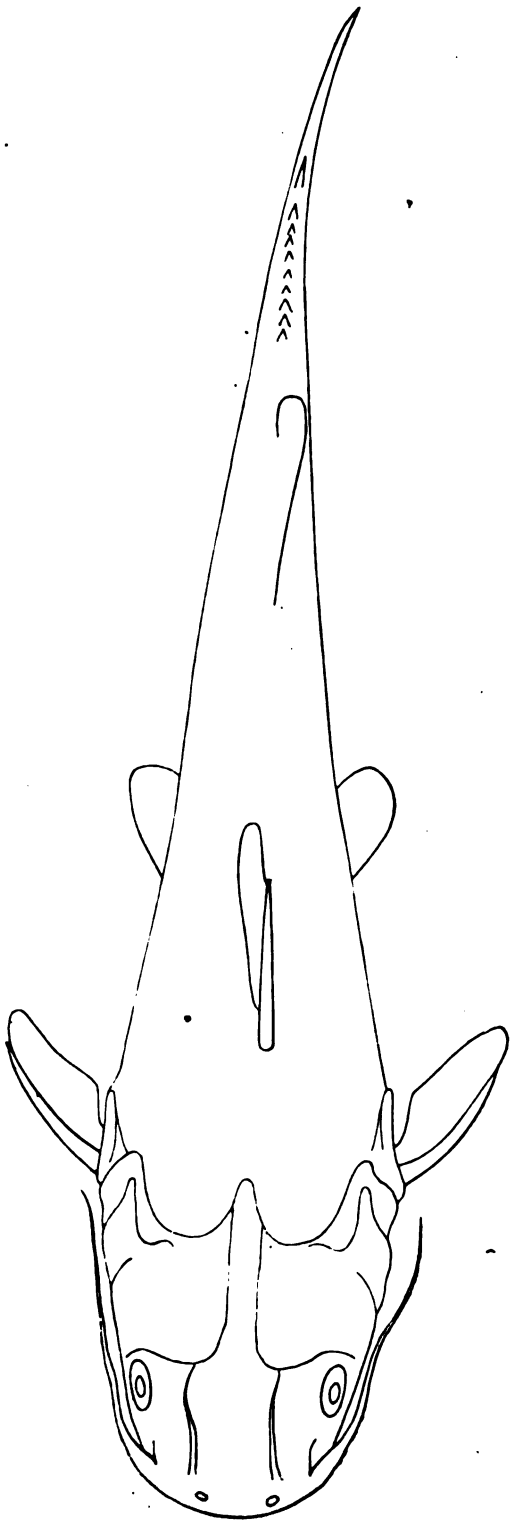


FIG. 41 (c)—Amiurus miapillicnsis (Cope.)
Miapillion Creek, Delaware. Nat. size from types.

PLATE 29.

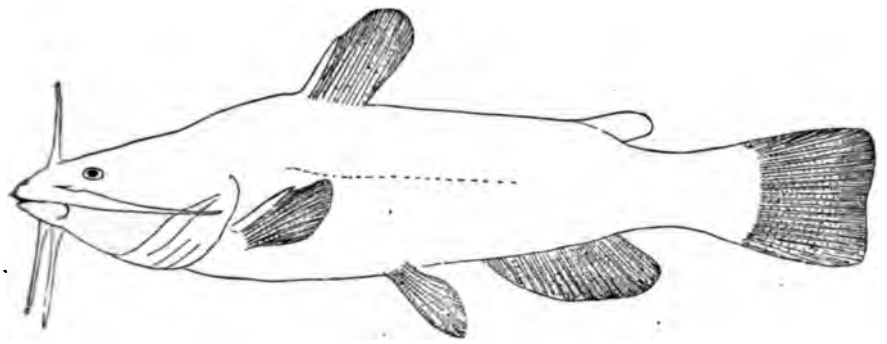


FIG. 42—Amiurus xanthocephalus (*Raf.*) Gill.
White R., Ind. Reduced one-half.

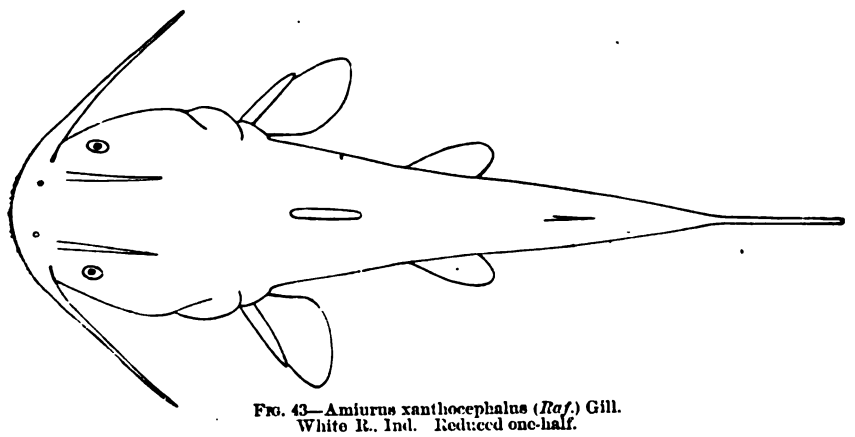


FIG. 43—Amiurus xanthocephalus (*Raf.*) Gill.
White R., Ind. Reduced one-half.

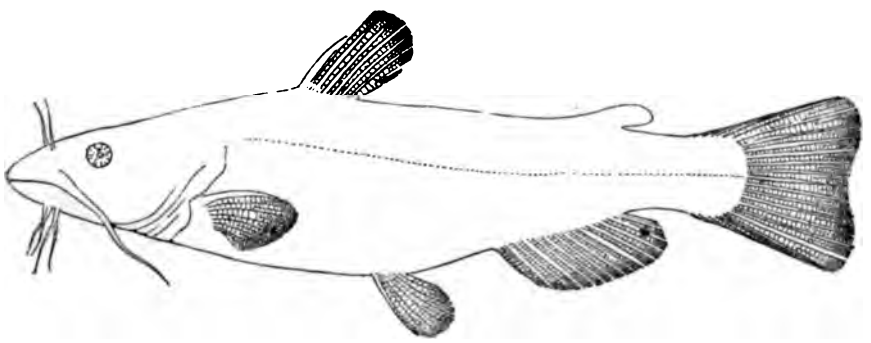


FIG. 44—Amiurus nigrilabris (*Cope*) Gill & Jordan.
Conestoga Creek, Pa. (From type.)

PLATE 30.

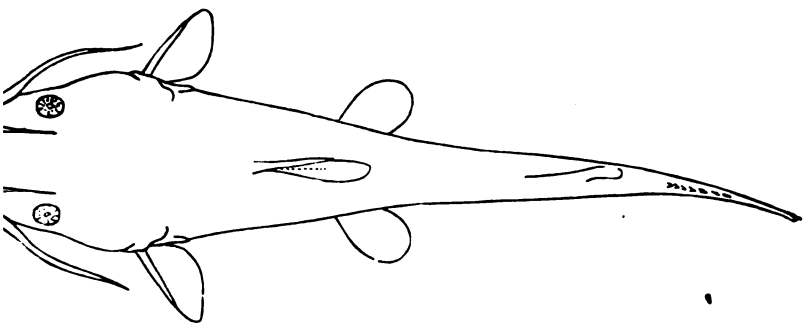


FIG. 45—Amiurus nigrilabris (*Cope*) Gill & Jordan.
Conestoga Creek, Pa. (From type.)

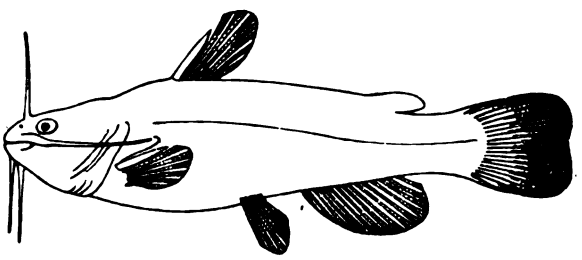


FIG. 46—Amiurus pullus (*Dekay*) Gill.
Genesee R., N. Y. Nat. size.

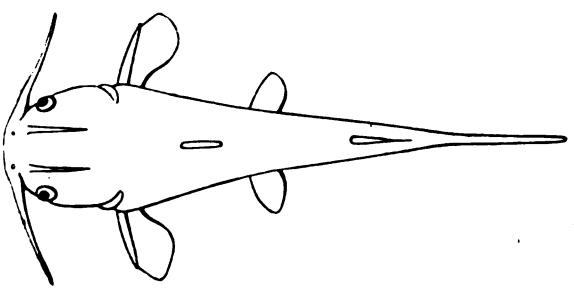


FIG. 47—Amiurus pullus (*Dekay*) Gill.
Genesee R.

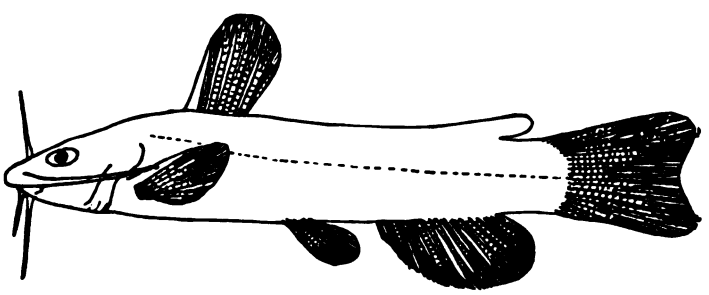


FIG. 48—Amiurus brunneus (Jor.)
Ocmulgee R., Ga. (Type.)

PLATE 31.

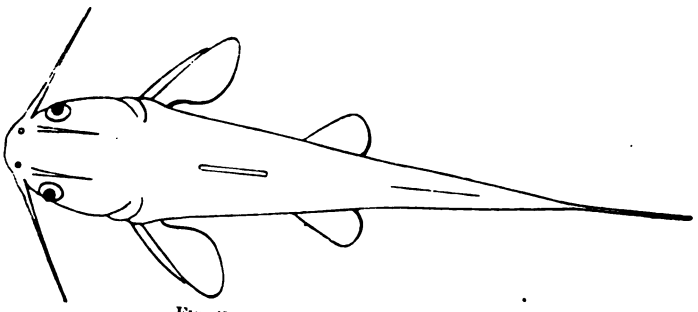


FIG. 49—Amiurus brunneus (*Jordan.*) Ocmulgee R., Ga. From types.

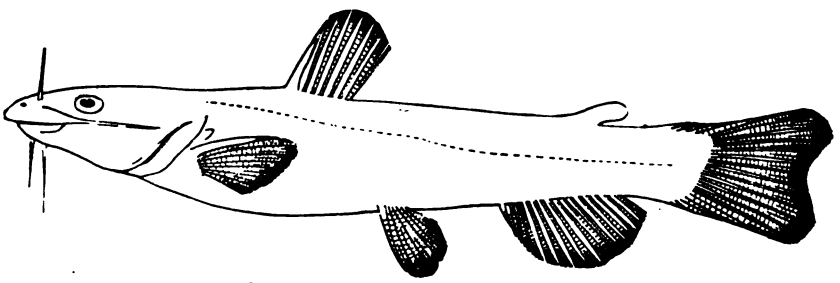


FIG. 49 (*b*)—Amiurus brunneus, Jordan. (*Adult.*) Saluda River, S. C. Reduced one-half.

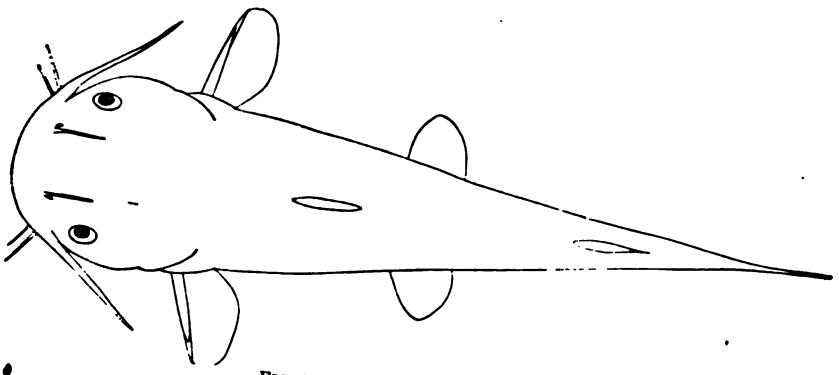


FIG. 49 (*c*)—Amiurus brunneus, Jordan. (*Adult.*) Saluda River, S. C. Reduced one-half.

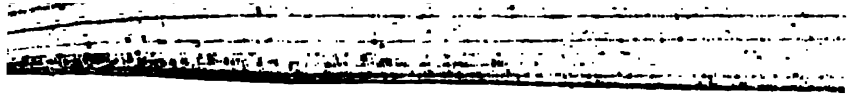


PLATE 32.

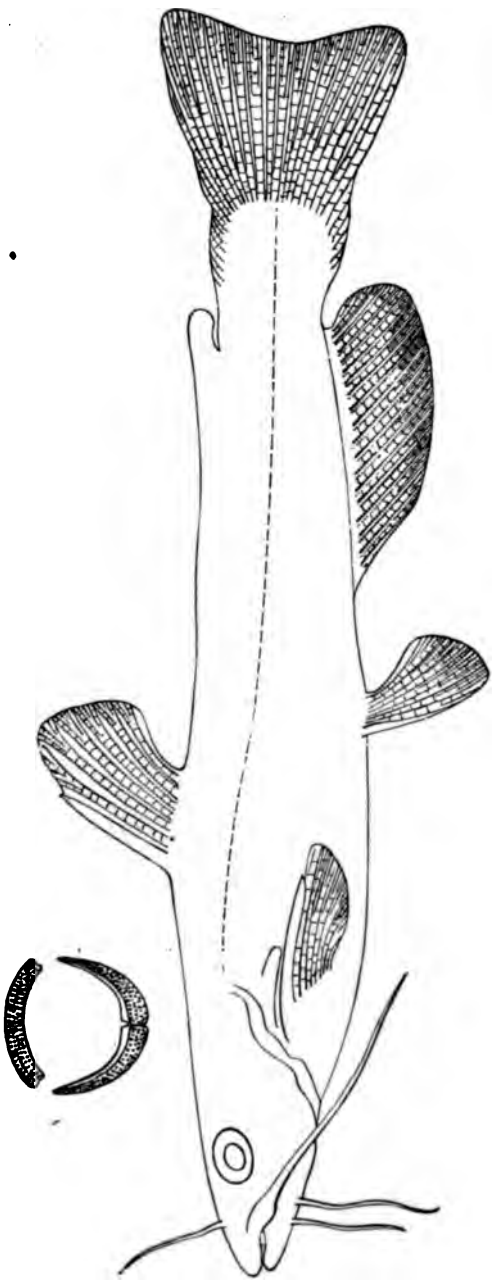


FIG. 50—Amiurus platycephalus (*Ord.*) Gill.
North Carolina.

PLATE 33.

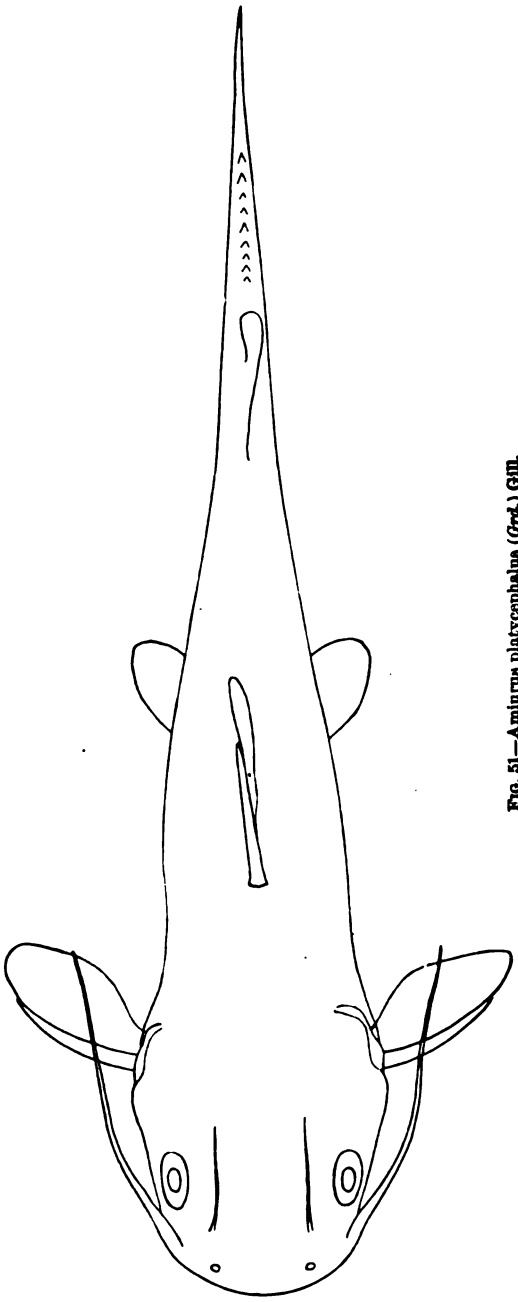


FIG. 51—Amiurus platycephalus (*Grd.*) Gill.
North Carolina.

PLATE 34.

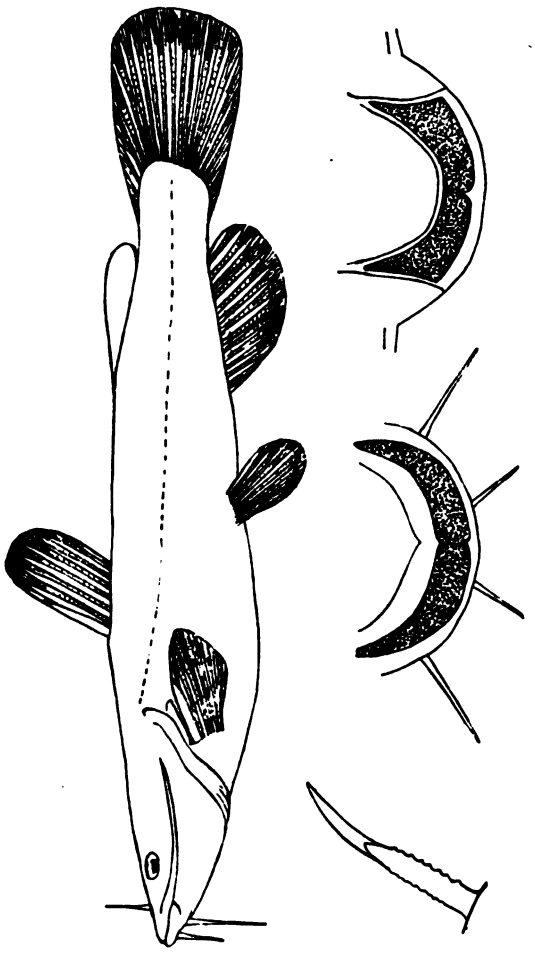


FIG. 59—Pololichthys olivaris (*Raf.*) G. & J.
French Broad R. Reduced one-half.

PLATE 35.

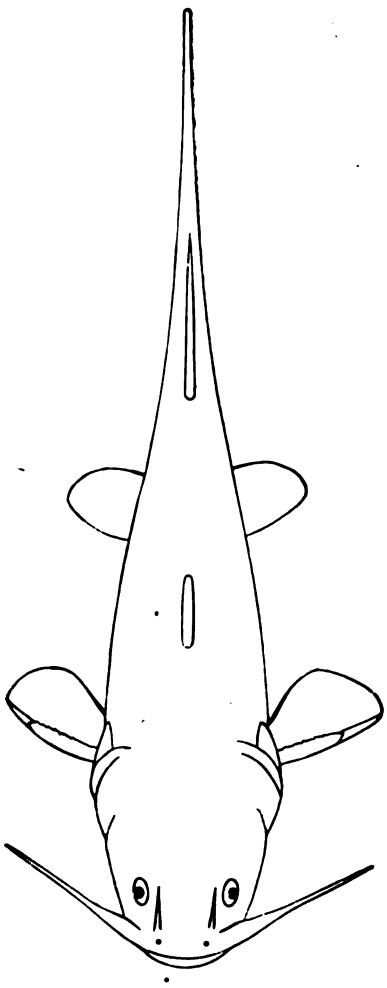


FIG. 53—Pelodichthys olivaris (*Raf.*) Gill & Jor.
French Broad R. Reduced one-half.

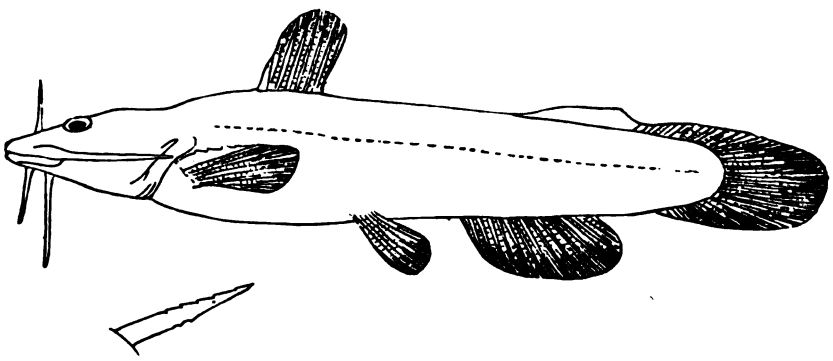


FIG. 54—Noturus flavus *Raf.*
Ohio R., W. Va. Reduced one-sixth.

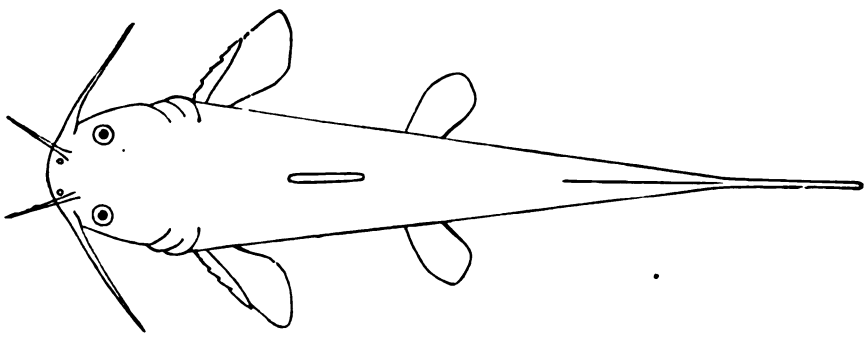


FIG. 55—Noturus flavus *Raf.*
Ohio R., W. Va. Reduced one-sixth.

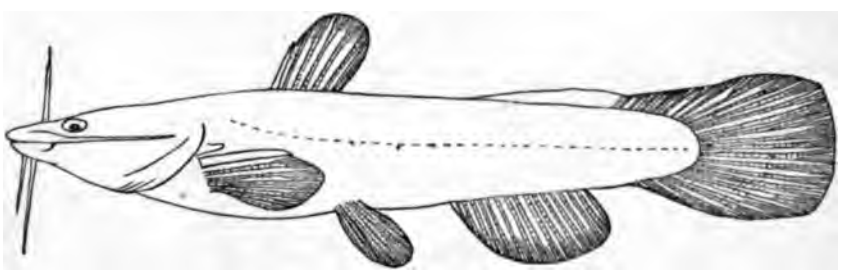


FIG. 56—Noturus insignis (*Rich*) G. & J.
Penna.

PLATE 37.

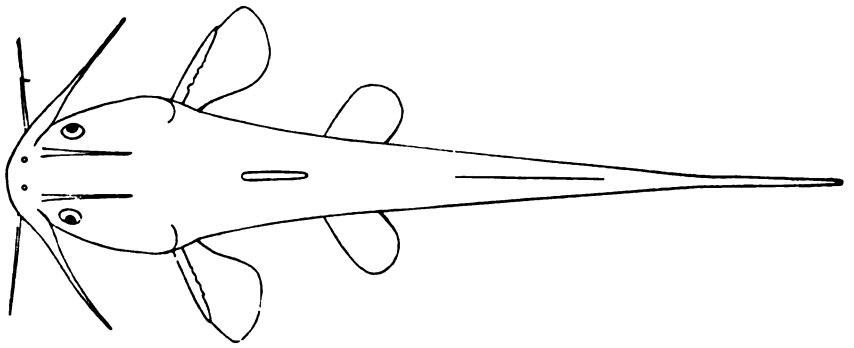


FIG. 57—Noturus insignis (*Rich.*) G. & J.
Penn.

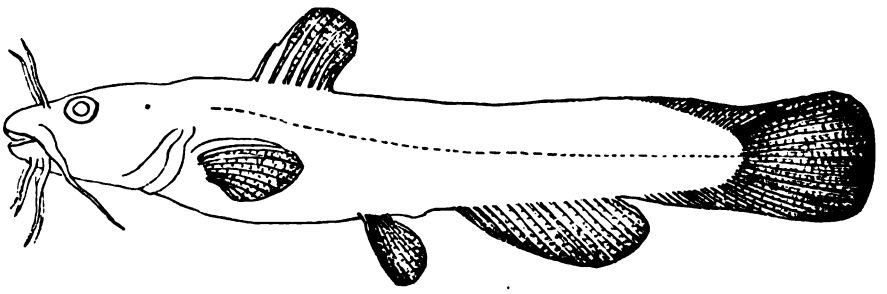


FIG. 57 (*b*)—Noturus insignis (*Rich.*) G. & J.
Penn.

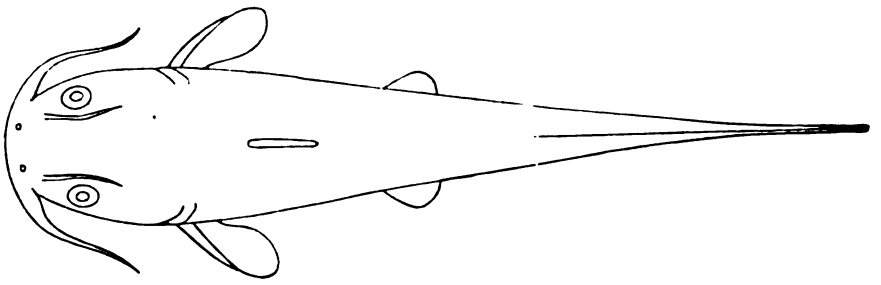


FIG. 57 (*c*)—Noturus insignis (*Rich.*) G. & J.
Penn.

PLATE 38.

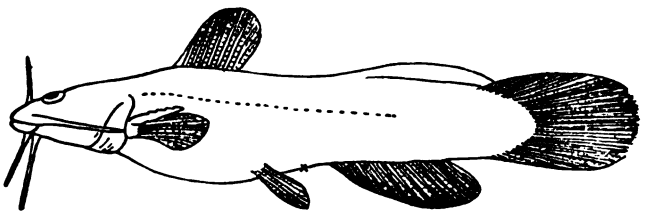


FIG. 58—Noturus exilis *Nelson.*
Root R., Wis. Nat size.

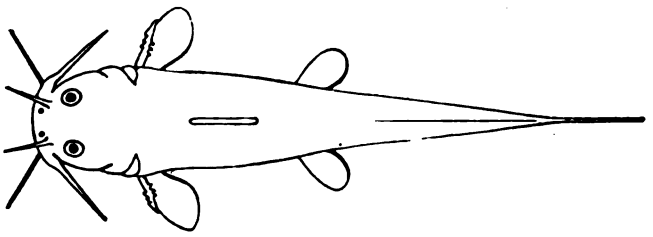


FIG. 59—Noturus exilis *Nelson.*
Root R., Wis. Nat. size.

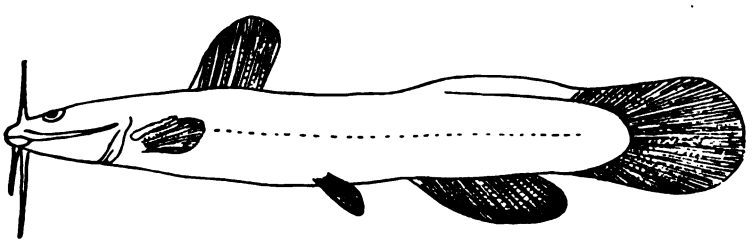


FIG. 59 (*b*)—Noturus exilis *Nelson.*
Illinois R. From one of three original types.

PLATE 39.

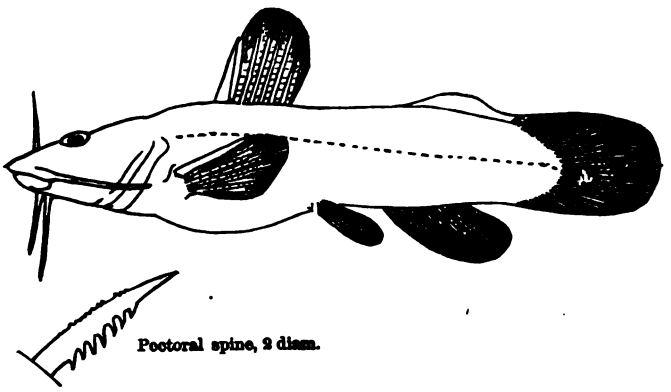


FIG. 60—Noturus miurus *Jordan.*
White R., Ind. Nat. size.

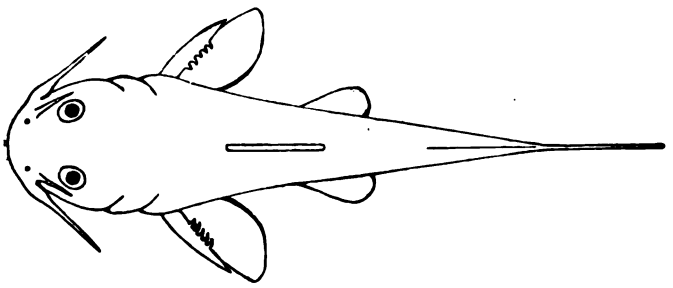


FIG. 61—Noturus miurus *Jordan.*
White R., Ind. Nat. size from type.

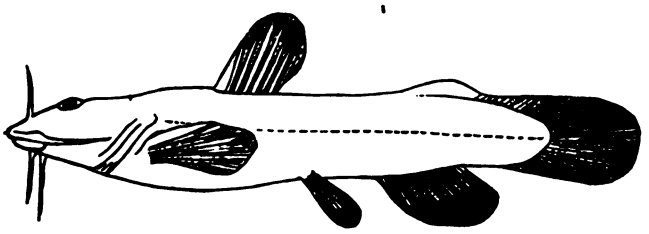
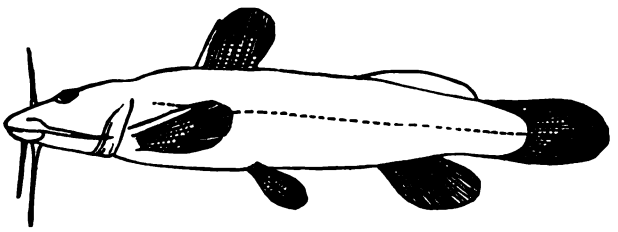


FIG. 61 (*b*)—Noturus miurus *Jordan.*
Ohio R., W. Va. Nat. size.

PLATE 40.



Pectoral spine, enlarged 2 diams.

FIG. 62—Noturus eleutherus *Jordan.*
French Broad R. Type nat. size.

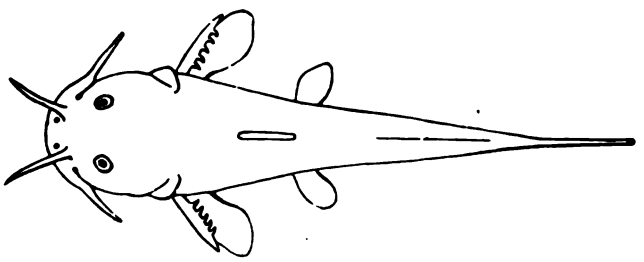


FIG. 63—Noturus eleutherus *Jordan.*
French Broad R. Type nat. size.

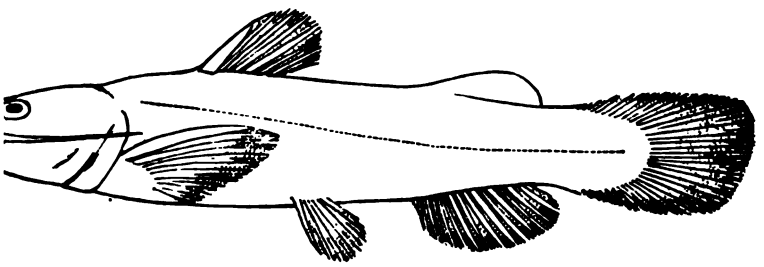


FIG. 63 (*b*)—Noturus eleutherus *Jordan.*
Tar River, N. C.

PLATE 41.

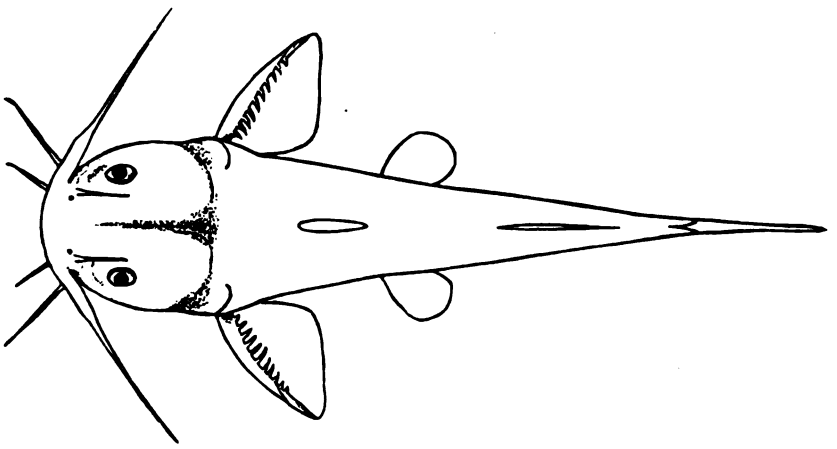
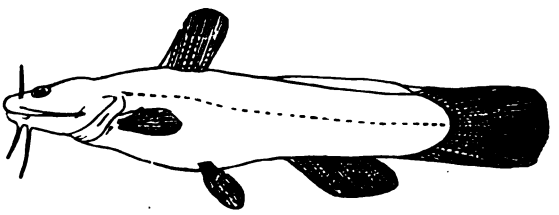


FIG. 63 (c)—Noturus eleutherus *Jordan*.
Tar River, N. C.



Pectoral spine, 2 diams.

FIG. 64—Noturus leptacanthus *Jordan*.
Etowah R., Ga. Type spec. Nat. size.

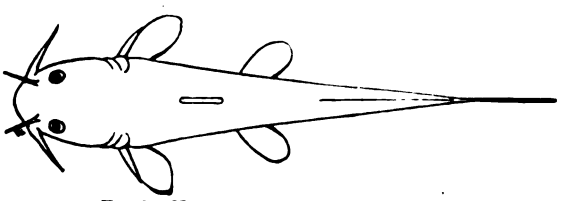


FIG. 65—Noturus leptacanthus *Jordan*.
Etowah R., Ga. Nat. size, type.

PLATE 42.

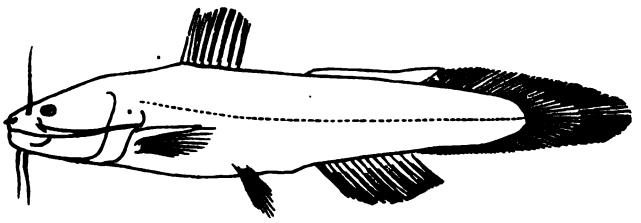


FIG. 66—Noturus gyrinus (*Mitch.*) Raf.
Hudson R. Nat. size.

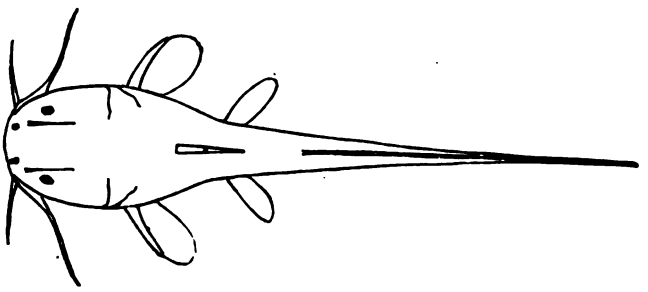
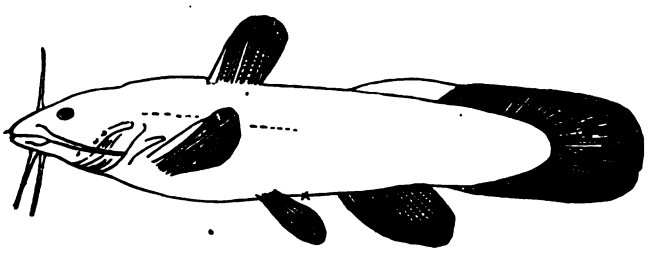


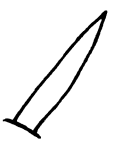
FIG. 67--Noturus gyrinus (*Mitch.*) Raf.
Hudson R.



Dentition of lower jaw.

Dentition of upper jaw.

FIG. 68—Noturus sialis *Jordan*.
White R., Ind. Nat. size.



Pectoral spine.

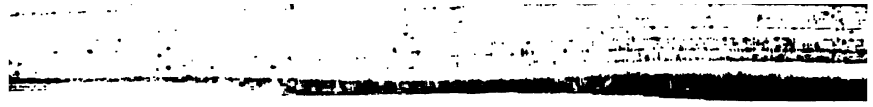


PLATE 43.

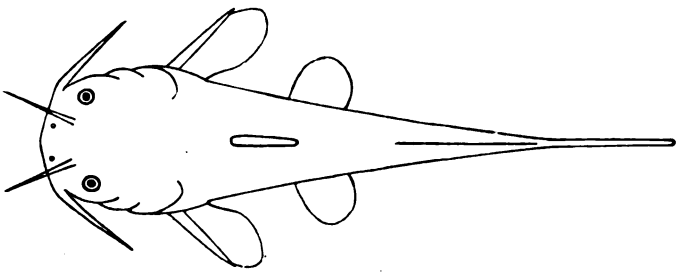


FIG. 69—Noturus sialis *Jordan.*
White River, Indiana. (Type, nat. size.)

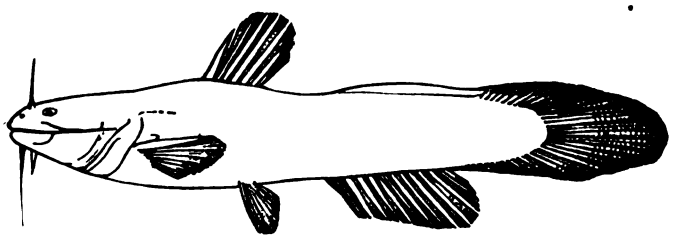


FIG. 69 (*b*)—Noturus gyrinus (*Mitch.*) Raf.
Hudson River. (Nat. size.)

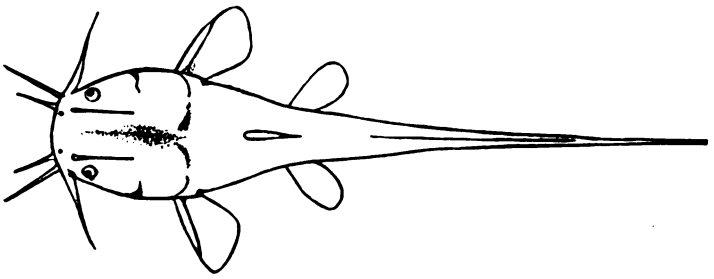


FIG. 69 (*c*)—Noturus gyrinus (*Mitch.*) Raf.
Hudson River. (Nat. size.)

PLATE 44.

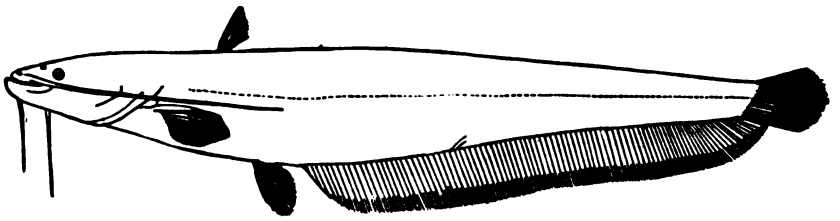
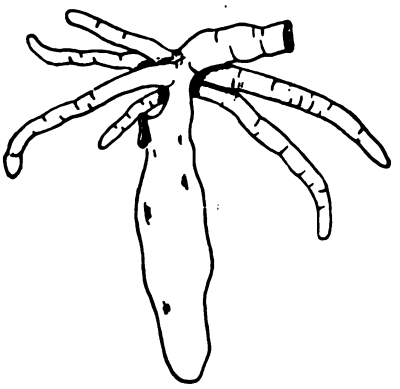
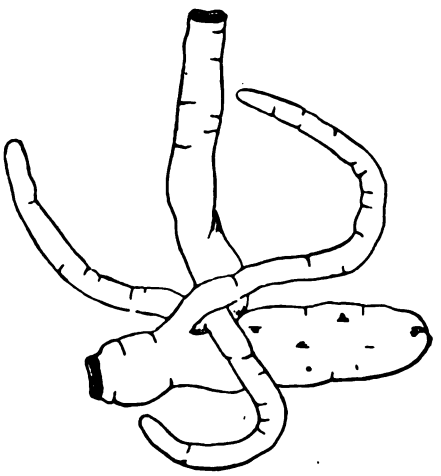


FIG. 70—Silurus glanis, *Linn.*
European Catfish; Sheatfish.
Lake Neufchatel, Switzerland.



Pyloric cœca (*a*)
FIG. 71—Stizostethium canadense (*Smith*) Jordan.
Reduced one-half.



Pyloric cœca (*b*)
FIG. 72—Stizostethium salmoneum *Raf.*
Reduced one-half.

PLATE 45.

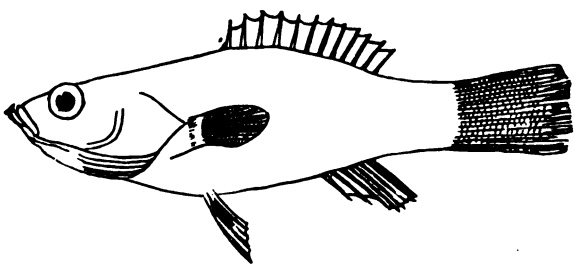


FIG. 73—Elassoma zonata *Jordan.*
Little Red R., Ark. Type enlarged 3 diams.

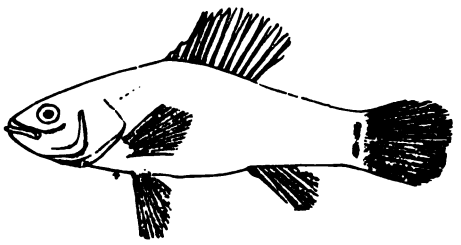


FIG. 74—Asternotremia mesotrema *Jordan.*
Little Red River, Ark.